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THE LIPOTROPIC FACTORS IN EXPERIMENTAL CIRRHOSIS

BY

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[WITH PHOTOGRAVURE PLATE]

The term "lipotropic" was introduced by Best and Ridout (1935) to describe substances which decrease the rate of deposition and accelerate the rate of removal of hepatic fat. This definition has now been broadened to embrace other established effects of dietary choline or its precursors. These include the prevention of renal lesions (Griffith and Wade, 1939) and of cirrhosis in experimental animals.

The production of cirrhosis in rats and dogs by dietary means afforded a new experimental approach to the study of liver disease (György and Goldblatt, 1939; Chaikoff and Connor, 1940). In rats it was shown that cirrhosis could be produced by feeding, for an extended period, a diet low in protein and devoid of choline. The appearance of the cirrhotic changes could be delayed or prevented by adding choline or its precursor methionine to the offending diet (György and Goldblatt, 1941; Webster, 1941; Daft, Sebrell, and Lillie, 1941; Blumberg and McCollum, 1941).

These observations aroused the interest of many clinical groups, and in the last few years methionine, choline, inositol, and combinations of these substances have been tested in the treatment of chronic liver disease. Owing partly to the inherent difficulty of controlling clinical studies adequately, and partly to the fact that the basal diets contained large and perhaps optimal amounts of the lipotropic factors, the results obtained are difficult to assess. In cirrhosis, especially that associated with alcoholism, it has been reported by a number of investigators (Russakoff and Blumberg, 1944; Barker, 1945; Beams, 1946; and others) that the addition of choline to the diet exerts a favourable clinical effect. The failure of this treatment to produce any beneficial result has also been reported (Yater, 1943; Man, Kartin, Durlacher, and Peters, 1945; and others).

It is well established that in animals in which cirrhosis has been produced by certain chemicals the hepatic lesions may disappear when the administration of the toxic agent is discontinued and a normal diet is supplied. It should be appreciated that most diets (whether for human subjects or experimental animals) which contain a large proportion of natural foodstuffs will provide adequate amounts of the lipotropic agents.

Cameron and Karunaratne (1936) observed that in cirrhosis produced by carbon tetrachloride extensive regeneration of liver cells and return to a normal configuration occurred within a few weeks after the administration of carbon tetrachloride was discontinued. Edwards and Dalton (1942) made similar observations on the regression of the cirrhotic process in the livers of mice receiving carbon tetrachloride when its administration was stopped and a normal diet provided. Lowry *et al.* (1941, 1945) found that when rats with dietary (choline deficiency) cirrhosis were treated with choline, or given a high casein diet, removal of fat from the liver occurred and extensive regeneration of liver cells took place. Comparative studies on the influence of the various lipotropic agents in the repair of cirrhotic lesions produced by carbon tetrachloride have not hitherto been reported.

The results of the present studies demonstrate again the importance of the lipotropic factors in the repair process, and serve to indicate the relative merits of dietary protein, methionine, choline, and inositol, alone or in combination, in the treatment of carbon tetrachloride cirrhosis in albino rats under certain experimental conditions.

Production of Cirrhosis.—Cirrhosis produced by prolonged administration of carbon tetrachloride has some advantages for this type of study. It can be produced consistently and relatively rapidly, and resembles human portal cirrhosis in many respects (Lamson and Wing, 1926; Moon, 1934). In our first series of experiments the cirrhosis was produced by exposing rats to carbon tetrachloride vapour, and in the second by administering a solution of this substance orally.

Experiment 1

Male white rats (average weight 136 g.) of the Wistar strain were exposed to an atmosphere containing approximately 1,000 p.p.m. of carbon tetrachloride for four hours a day, five days a week, until moderate cirrhosis had been produced. This usually required from 25 to 35 exposures. The capacity of the exposure chamber was approximately 1,000 litres, and an air flow of 250 to 300 litres a minute was maintained.

The rats were kept in group cages and were supplied with a commercial stock diet ("purina fox chow") and fresh water. The 164 animals surviving the exposures were divided into 13 groups. One group of 20 animals was sacrificed immediately to provide initial histological and chemical data. One group (seven animals), to serve as a control, was placed on a hypolipotropic basal diet containing gelatin 12%, casein 8%, beef

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dripping 10%, corn oil 2%, salts 5%, cellu flour 2%, vitamin powder 1%, sucrose 59.75%, cod-liver oil concentrate 0.015%, cystine 0.24%. This amount of cystine was added in order to make the total organic sulphur content approximately equivalent to that of a diet containing 20% casein.

The vitamin powder was of such a composition that the intake per 10 g. of diet was as follows : thiamin hydrochloride 50 μg., riboflavin 25 μg., pyridoxin hydrochloride 20 μg., calcium pantothenate 100 μg., and niacin 100μg. The cod-liver oil concentrate supplied at least 300 i.u. of vitamin A and at least 75 i.u. of vitamin D per 10 g. of diet.

Ten different diets were prepared by adding to the basal ration various lipotropic supplements, as listed below. The quantities stated are the amounts in grammes per 100 g. of final mixture, the supplements in each case replacing an equal weight of sucrose in the basal ration : (1) casein 7, arachin 5, fibrin 3 ; (2) casein 7, arachin 5, fibrin 3, choline chloride 0.3 ; (3) casein 30 ; (4) casein 22, arachin 5, fibrin 3 ; (5) choline chloride 0.3 ; (6) methionine 0.9 ; (7) inositol 0.3 ; (8) choline chloride 0.3, inositol 0.3 ; (9) methionine 0.9, inositol 0.3 ; (10) choline chloride 0.3, inositol 0.3, methionine 0.9. There were 20 animals in Group 5, seven in Groups 3, 4, and 6, and 13 in all the others.

A final group (20 animals) continued to receive the laboratory stock diet (purina fox chow), which is referred to as Diet 11. All diets, with the exception of the last-mentioned, were essentially isocaloric. While receiving dietary treatment the animals were kept in individual cages. Each rat was offered 15 g. of the appropriate diet daily and the actual food consumption was recorded. When the average daily food intake of the group which ate the least (Diet 7) fell to 13 g. a corresponding reduction was made in the food offered to the other groups. After three weeks, and at intervals for the succeeding nine weeks, three or more rats from each group were sacrificed and their livers were removed for chemical and histological examination. Extraction and analysis of liver lipids were conducted as described by Best, Lucas, Patterson, and Ridout (1946).

Experiment 2

A 20% solution of carbon tetrachloride in corn oil was administered to female white rats (average weight 160 g.) of the Wistar strain two or three times a week over a period of four months. A dose of approximately 0.2 ml. of the solution was given to each animal by stomach-tube. During this phase of the experiment the rats were kept in group cages and were offered the stock diet and water ad libitum. They were then divided into five groups of 10 rats each, and one group was sacrificed immediately to secure initial values. The remaining groups were placed on rations the following components of which were common to all four diets : beef dripping 10, corn oil 2, cellu flour 2, salt mixture 5, vitamin powder 1, cod-liver oil concentrate 0.015. After the addition of the supplements listed below, sucrose was added to bring the mixture to 100 parts. Diet 21 contained casein 10%, cystine 0.2% ; Diet 22, casein 10%, cystine 0.1%, methionine 0.1% ; Diet 23, casein 20%, cystine 0.2%, methionine 0.2% ; Diet 24, casein 10%, cystine 0.1%, methionine 0.1%, choline 0.3 %. Four rats from each group were sacrificed after two weeks and the remainder after 13 weeks on the test diets.

Results of Experiment 1

In the group killed immediately after exposure to carbon tetrachloride considerable variation in the gross appearance of the liver was observed. Most of the livers were coarsely but evenly granular (Plate, Fig. 1), of a yellowish-brown colour, and of a rubbery consistency. Microscopically, wide bands of fibrous tissue separated the liver cells into pseudo-lobules with no visible central vein. No normal lobular structure was discernible. Some cells were laden with fat, while others showed hydropic or fatty degeneration (Fig. 2). Cellular necrosis, pyknotic nuclei, and haemorrhage into the parenchyma were also present (Fig. 3). Groups of liver cells with mitotic figures could be seen in many lobules. The average fat content, estimated on a pooled sample made up of large representative portions of each liver, was only 6.4% of the wet weight. In microscopical sections stained with Sudan IV the amount of fat visible suggested a greater deposition of lipid than that demonstrated by chemical analysis.

The livers of rats maintained on the hypolipotropic basal diet became very fatty (20 to 30% of wet weight), and all but one of the animals died within three weeks. The surviving animal, which was sacrificed at three weeks, also showed extensive cirrhotic changes. The kidneys of all these animals showed the dilated tubules and atrophic degenerative "nephrosis" commonly seen in older animals receiving hypolipotropic diets (Hartroft, 1948). When choline (0.3%) was added to the basal diet, either alone (Diet 5) or in combination with the other supplements (Diets 2, 8, and 10), fat disappeared from the liver and a remarkable regeneration of liver cells took place. In rats killed after three weeks on these rations (Diets 2, 5, 8, and 10), parenchymal cells filled the lobules, but only a few mitotic figures could be seen at this time. This probably indicated that maximum regeneration of parenchymal cells had already taken place. A number of circumscribed lobules of deeply staining cells were seen. The flattened cells at the periphery of these lobules produced a whorled appearance. Pressure due to the bands of fibrous tissue may have been responsible for this condition (Fig. 4). The fibrous strands were thinner but appeared to be stained more deeply than in the livers of the controls. This appearance was probably due to "condensation" of the fibrous tissue. In specimens secured after 6, 9, and 12 weeks gradual improvement was noted, so that latterly (12 weeks) the livers were normal in colour and consistency (Fig. 5). Microscopically, many sections of the livers were essentially normal in appearance (Fig. 6). When special stains for fibrous and reticular tissues were applied thin strands were seen forming a network around and through the lobules (Fig. 7).

Supplements of methionine (0.9%, Diet 6), or of a quantity of casein (30%, Diet 3) which added approximately the same amount of methionine, produced favourable and essentially similar results. Equally beneficial effects attended the use of the laboratory stock ration (Diet 11). The gross and microscopical findings observed on all these diets (Nos. 3, 6, and 11) resembled closely those described above for the animals receiving choline.

Supplementation with inositol alone (Diet 7) possibly had a favourable effect on survival of the rats. Although the growth was poor the mortality rate in the group receiving inositol was of the same order as in those receiving supplements of other lipotropic substances. However, with inositol the livers became very fatty (21 to 29%), as shown in Fig. 5 (lower right), and the extent of the fibrosis apparently increased. In the kidneys definite changes similar to those seen in animals suffering from subacute choline deficiency (Griffith, 1941 ; Hartroft, 1948) were invariably present.

In rats receiving the very high casein supplement (Diet 3) or the mixed protein supplement (Diet 4) the livers were larger than those of the group supplemented with choline alone but did not differ in other important characteristics. The high-casein diet (No. 3) contained about 1,260 mg. of methionine per 100 g. of diet.

A high-protein diet (No. 1), which was lower in methionine than Diets 3 or 4, produced less beneficial results. While the 15% supplement of protein (casein 7%, arachin 5%, fibrin 3%) made a total of 35% protein in this diet, it provided only about 670 mg. of methionine per 100 g. This amount permitted rapid growth, but the fat content of the livers of these rats rose to high levels while this was taking place. It was only when a plateau in the growth curve was reached that the level of liver fat decreased. At three weeks fat was distributed evenly throughout the lobule, but subsequently, as the fat content fell, distribution became limited to the region of the central vein. The livers were large, light brown in colour (Fig. 5, lower left), and firm to cut. Fibrous strands could be seen on the cut surface. It was not surprising, therefore, to find microscopically that fibrous tissue was present in larger amounts than in groups supplemented more adequately with the lipotropic factors.

In the groups receiving adequate choline or methionine (free or combined in protein) the normal columnar appearance of the liver cells was quickly restored, so that no apparent compression of bile canaliculi or sinusoids existed. In the groups not supplemented adequately these structures appeared to be compressed by cells containing fat. There was no evidence that

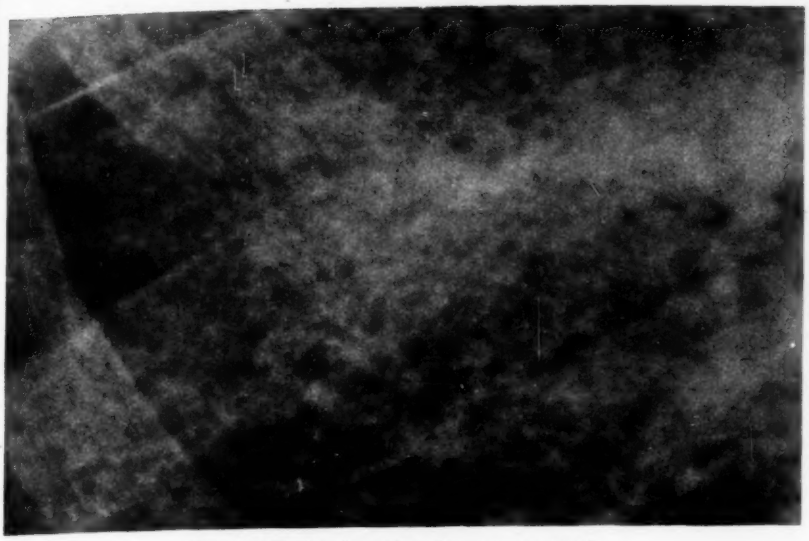


FIG. 1.—Pin-head mottling in pneumoconiosis.

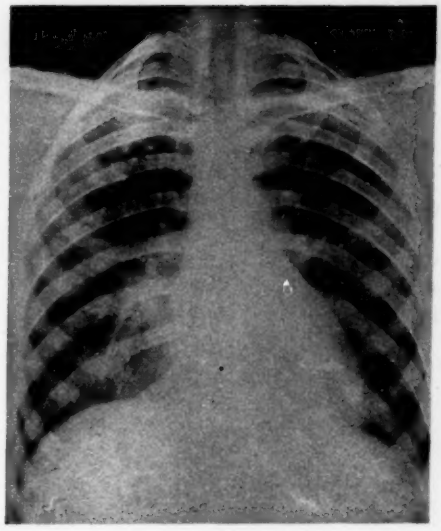


FIG. 4.—Steam-coal collier, aged 34. Chest *X*-ray, Aug., 1941, on leaving underground work.

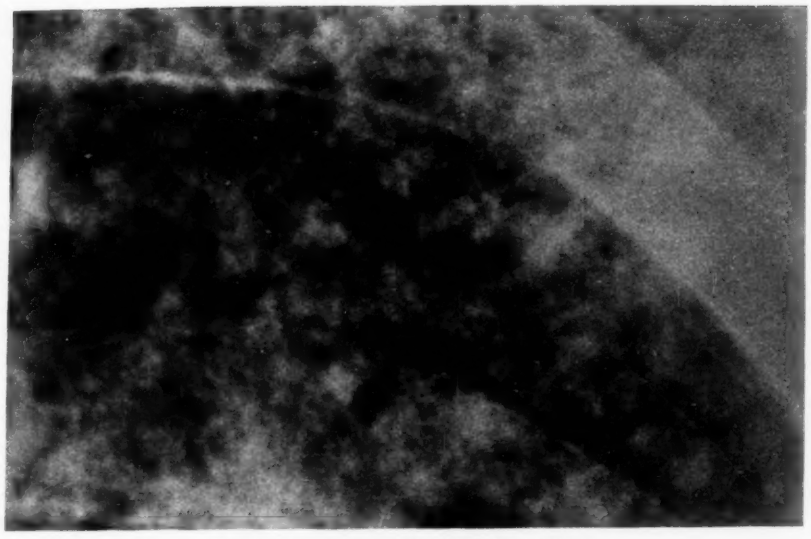


FIG. 2.—Aggregates of pin-head mottling.

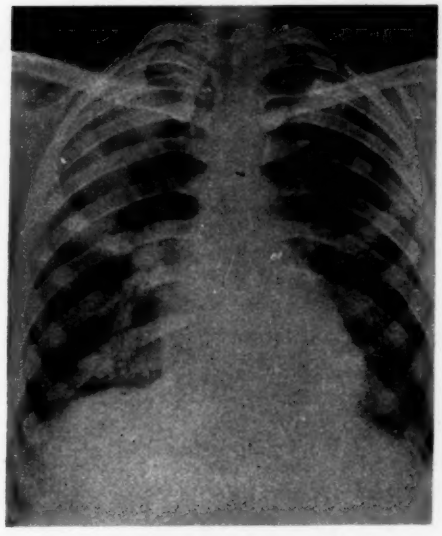


FIG. 5.—Same case as Fig. 4. July, 1943,

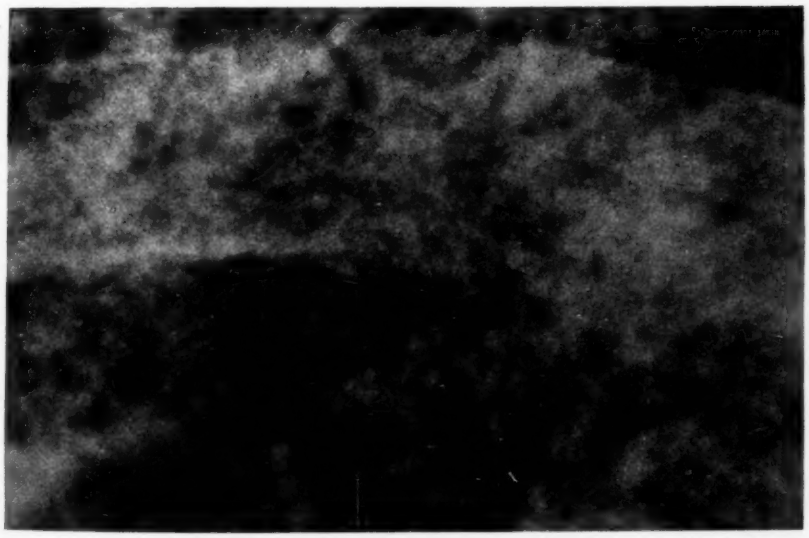


FIG. 3.—Common mixed type of mottling.

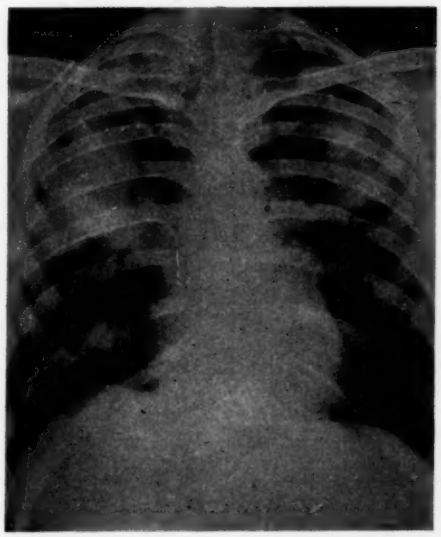


FIG. 6.—Same case as Fig. 4. Nov., 1946.

FIG. 1.—Cirrhotic liver of the type produced after 28 exposures of 4 hours each to carbon tetrachloride, 1,000 p.p.m.

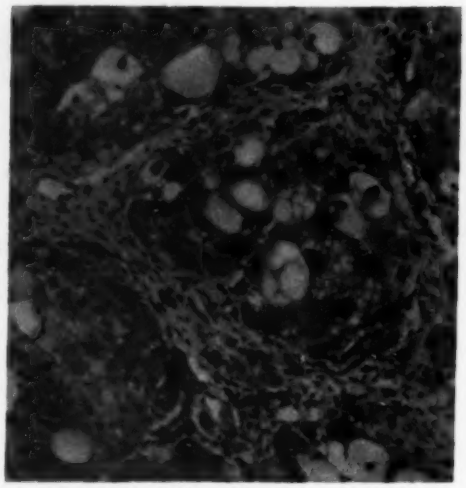


FIG. 2.—Cirrhotic liver (H. & E. × 180). Fibrous trabeculae separate liver parenchyma into pseudo-lobules one-half size of normal lobule. Some hepatic cells laden with fat.

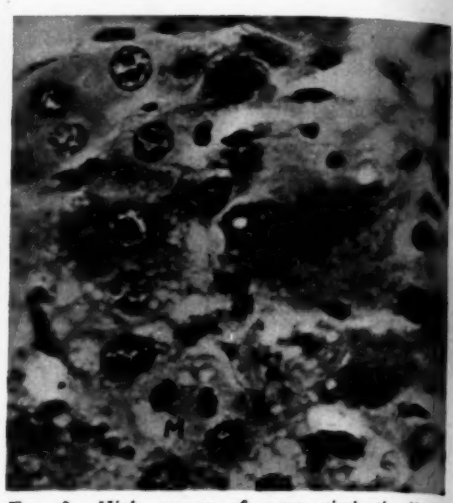


FIG. 3.—High power of same cirrhotic liver (H. & E. × 700) shows nuclear degeneration and a mitotic figure (M). Vacuolation of cytoplasm indicates site of fatty deposits.

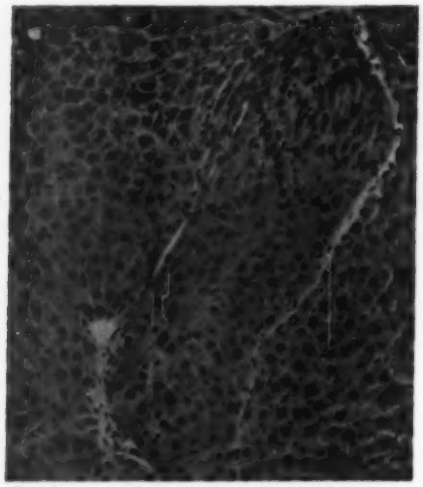


FIG. 4.—Liver from rat on Diet 5 (hypolipotropic basal diet plus choline) after 3 weeks' dietary treatment. Lobule of irregular shape made up of hyperchromatic cells is illustrated. Fat has disappeared from hepatic cells and extensive regeneration has taken place. Decrease in fibrous tissue is already apparent.

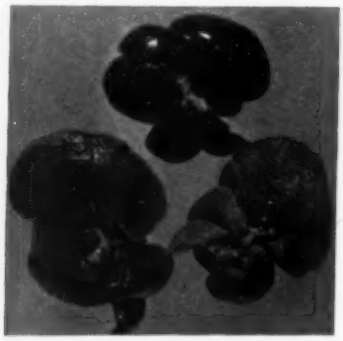


FIG. 5.—Illustrates appearance of livers after 12 weeks' dietary treatment. Upper: liver normal in appearance, as from animals receiving supplements of choline or its precursors. Lower left: large pale liver with surface irregularity, from Group 1 (high-protein diet of relatively low methionine content). Lower right: fatty cirrhotic liver from Group 7 (inositol supplement).

FIG. 6.—Photomicrograph of liver of rat on Diet 5 (choline supplement, 12 weeks) (H. & E. × 370). Vacuolated appearance of cytoplasm revealed by special staining to be due to glycogen; fibrous tissue scarcely discernible.

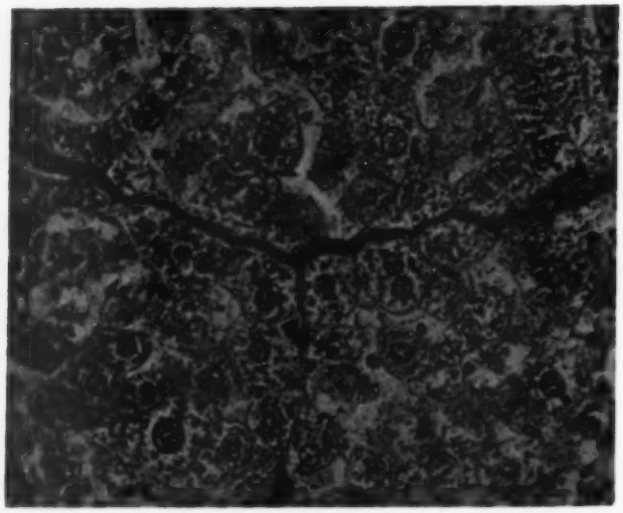


FIG. 7.—Section shown in Fig. 6 stained to reveal fibrous tissue (Masson × 370); a thin strand can be seen in the illustration.

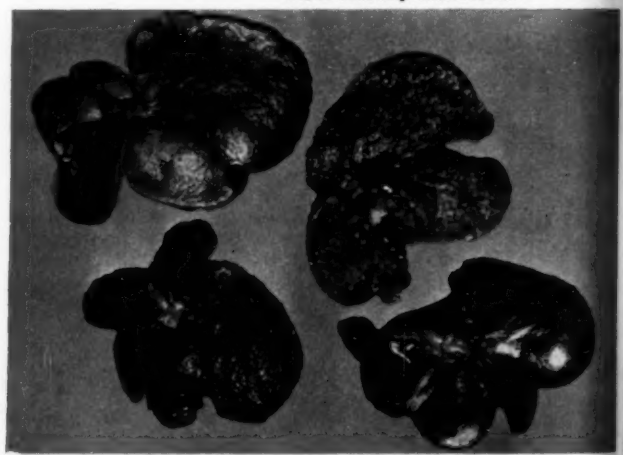


FIG. 8.—Appearance of livers of rats of Experiment 2 after dietary treatment for 13 weeks. Upper left: cirrhotic liver of rat fed Diet 21. Upper right: dietary methionine, increased but still inadequate (Diet 22), effects some reduction in liver fat but no improvement of cirrhotic condition. Lower left: protein supplement enriched with organic sulphur (Diet 23, methionine adequate) results in liver of normal size and colour but with slightly irregular surface. Lower right: liver of rat fed Diet 24 (*i.e.*, Diet 22 supplemented with choline) appears normal.

SILICEOUS GRANULOMA DUE TO TALC

W. A. MACKEY AND J. B. GIBSON

FIG. 1.—Section of wall of Meckel's diverticulum (× 35). Dense fibrous tissue has replaced subserous fat. Complex of giant cells surrounds talc particles centrally and at serous surface.

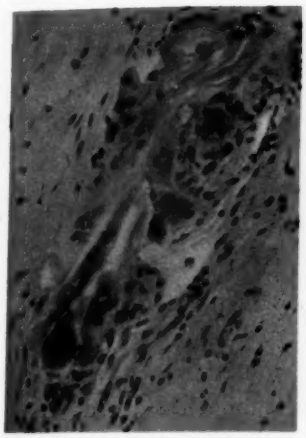


FIG. 2.—Syncytial giant-cell reaction enclosing talc particles (× 200).

FIG. 3.—Same field as Fig. 2 seen through partially crossed "polaroid" screens.

G. HARVEY SMITH

FIG. 1.—Partly crossed "polaroid" screening shows mass of doubly refractive material with cellular reaction under serosal surface of Fallopian tube.

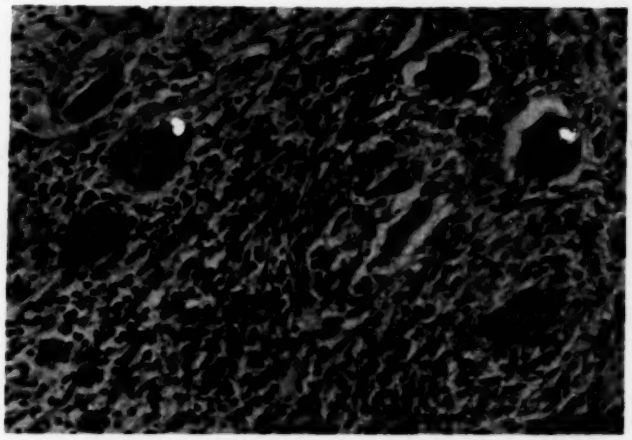


FIG. 2.—Partially crossed "polaroid" screening of granulomatous lesion in wall of Fallopian tube. Note histological similarity to tuberculosis. Two giant cells show doubly refractive masses of talc.

WILLIAM WALKER

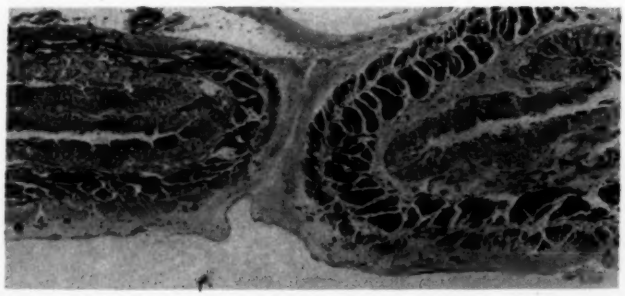


FIG. 1.—Adhesion between two loops of small intestine, one obviously hypertrophied. Thin collagenous fusion zone only slightly cellular, but giant cells are present (× 8).

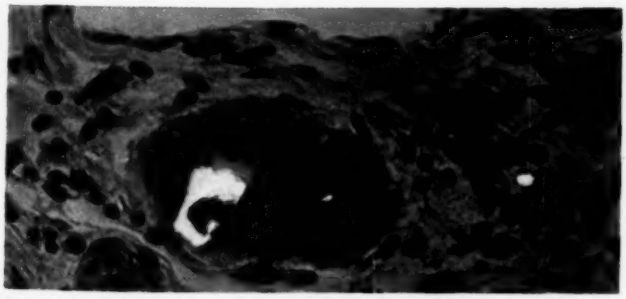


FIG. 2.—Partially crossed "polaroid" screening shows multinucleated giant cell containing doubly refractive material, slightly displaced (× 250).

F. R. MAGAREY AND P. H. DENTON: TORULA HISTOLYTICA INFECTION OF CENTRAL NERVOUS SYSTEM

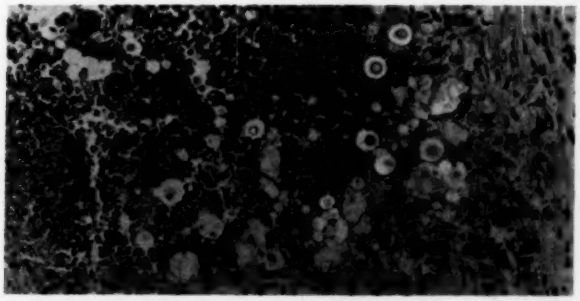


FIG. 1.—*Torula histolytica* in section of meninges (× 130).

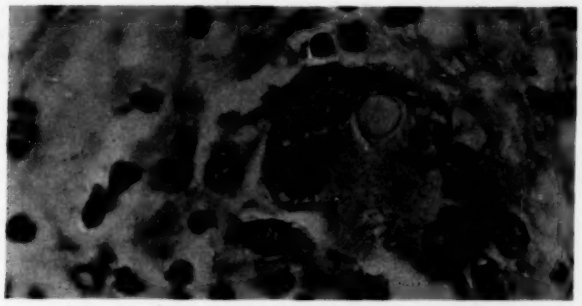


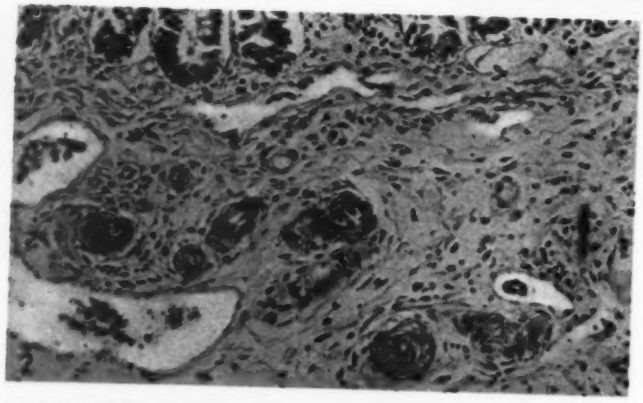
FIG. 2.—Torula body in subependymal giant cell (× 720).

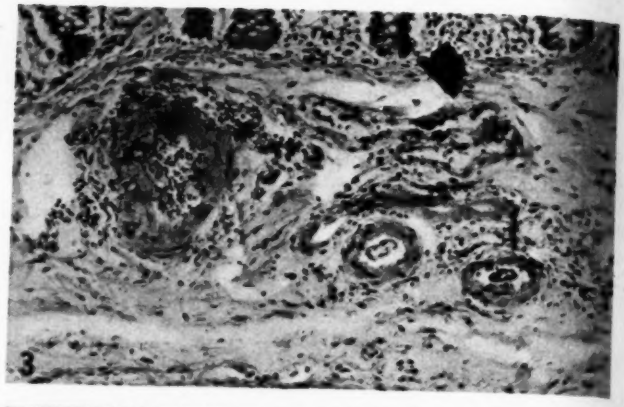
GEORGE J. CUNNINGHAM: INTESTINAL LESIONS IN MALIGNANT HYPERTENSION

FIG. 1.—Low-power view of one of the many ulcers found in the ileum at necropsy.

FIG. 2.—Extreme diminution of arteriolar wall. Overlying mucosa can be seen at the top of the picture (× 150).

FIG. 3.—Arteriolar necrosis. Vessel on left shows disintegration of its walls and cellular infiltration (× 100).





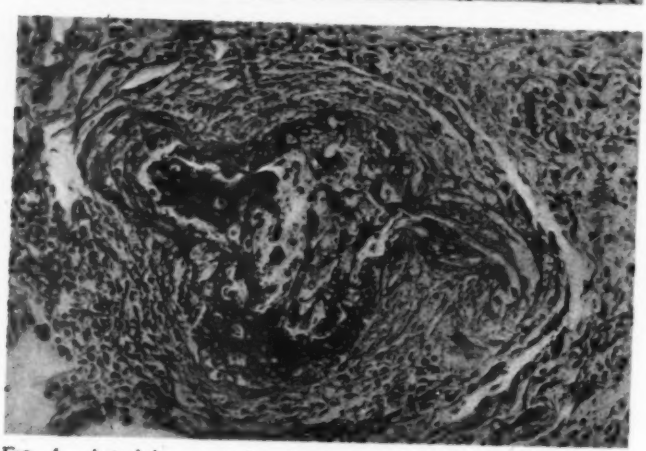


FIG. 4.—Arteriolar necrosis. Larger vessel shows disintegration of wall. Lumen identified only by presence of a few red cells (× 160).

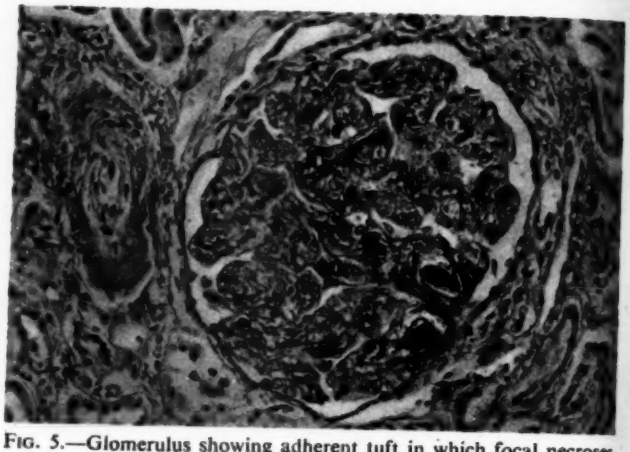


FIG. 5.—Glomerulus showing adherent tuft in which focal necroses can be seen (× 150).

K. DAMODARAN: THE LIVER IN INFECTIVE HEPATITIS

FIG. 1.—Acute necrosis (× 170).

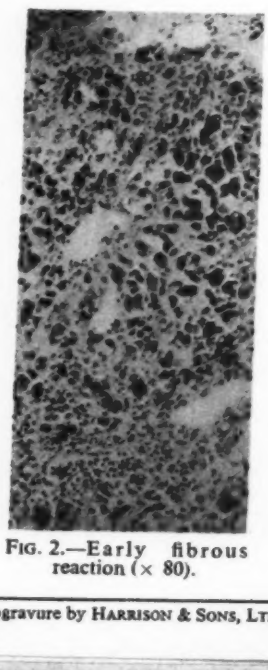


FIG. 2.—Early fibrous reaction (× 80).

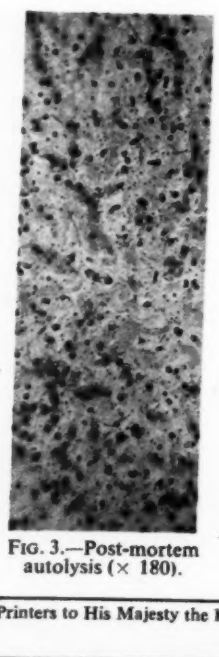


FIG. 3.—Post-mortem autolysis (× 180).

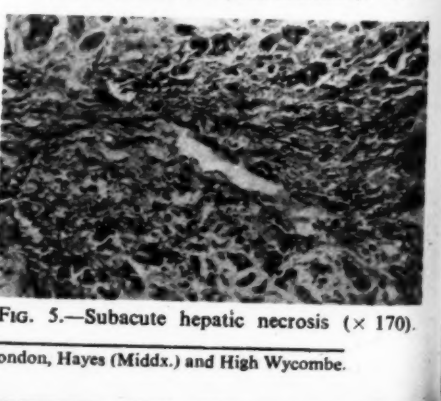


FIG. 4.—Subacute hepatic necrosis (× 30).

FIG. 5.—Subacute hepatic necrosis (× 170).

Illustrations printed in Collogravure by HARRISON & SONS, LTD., Printers to His Majesty the King, London, Hayes (Middx.) and High Wycombe.

combinations of the lipotropic substances produced either more rapid or more complete repair in this type of cirrhosis than did adequate intake of either choline or methionine alone.

Chemical estimation of total liver lipids on large portions of individual livers of rats killed after 3, 6, 9, and 12 weeks on the various diets revealed that no significant increase in liver fat occurred except in the rats fed the hypolipotropic basal diet and in the group of animals receiving a supplement of inositol alone (Diet 7). The transitory increase of liver fat in the rats receiving Diet 1 (high protein, of relatively low methionine content) has already been mentioned.

Results of Experiment 2

In this series, in which carbon tetrachloride had been administered orally, the livers of animals killed after receiving the low protein Diets 21 and 22 for only two weeks appeared somewhat altered—the fibrosis had apparently diminished to some extent but the fat content had increased. The apparent decrease in fibrosis may be largely attributed to condensation of the fibrous bands. Much more lipid had accumulated in the livers of the animals on Diet 21 than in those on Diet 22, in which a small (but obviously inadequate) amount of methionine was supplied (see Table). The liver lipids increased slowly in the rats on Diet 22 and eventually reached a moderately high level. The picture changed when the animals were maintained on these rations (Diets 21 and 22) for 13 weeks. The livers were obviously fatty and appeared coarsely granular or nodular (Fig. 8). A progression of the fibrotic process had occurred, so that the degree of fibrosis ultimately resembled that of the control group. Clearly, the cirrhotic lesions were not affected favourably by the low-protein diets.

Table showing Dietary Conditions and Results of Experiment 2

Group and Diet No.	Protein Content and Supplement	Duration (Weeks)	Degree of Fibrosis*	Total Liver Lipids % (wet wt.)	No. of Livers Examined
Control group (before treatment)			3–4	7·5	10
21	Casein 10% + Cystine 0·2%	2	2–3	24·6	4
		13	3–4	26·7	5
22	Casein 10% + Cystine 0·1% + Methionine 0·1%	2	2–3	10·8	4
		13	3–4	17·7	5
23	Casein 20% + Cystine 0·2% + Methionine 0·2%	2	2–3	6·5	4
		13	1	9·7	5
24	Casein 10% + Cystine 0·1% + Methionine 0·1% + Choline 0·3%	2	2–3	5·3	4
		13	1	7·8	5

* The degree of fibrosis in this series was graded arbitrarily from 1 to 4. Grade 1 = a slight increase above the normal amount of fibrous tissue, usually demonstrable only by special staining. Grade 4 = Extensive fibrosis involving 30% or more of every low-power (× 100) field.

The gross appearance of the livers of the rats receiving relatively high protein (Diet 23) or choline and methionine (Diet 24) was essentially normal. Microscopically and chemically it was shown that Diet 23 (20% casein supplemented with 0.2% cystine and 0.2% methionine) decreased the liver fat and caused diminution of the fibrosis as efficiently as did Diet 24 (10% casein supplemented with 0.1% cystine, 0.1% methionine, and 0.3% choline).

Discussion

All the experiments described in this study are concerned with the dietary treatment of young adult white rats in which a moderate degree of cirrhosis had been produced by administration of carbon tetrachloride.

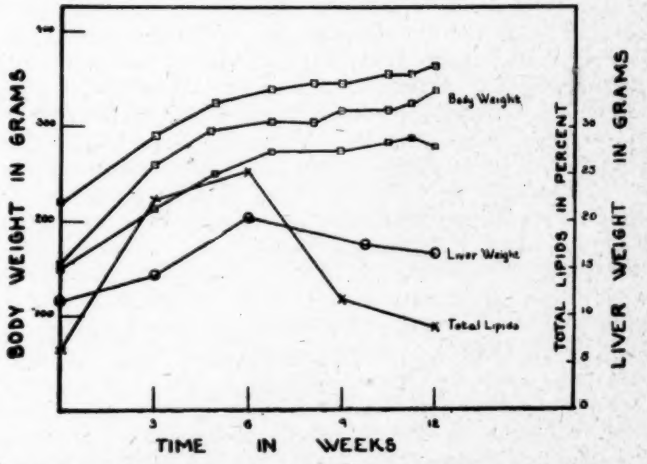
In Experiment 1 the choice of protein for the basal mixture to which the test supplements were added was influenced by the desire to keep the amount of methionine in the diet at the lowest level that would maintain weight in the young adult rats. Beveridge, Lucas, and O'Grady (1944) had shown that a ration containing 8% casein and 12% gelatin fulfilled these requirements. This protein mixture is, of course, low in both organic sulphur and the lipotropic factors. As previously stated, cystine (0.24%) was added to correct, in large part, the sulphur deficiency. A deficiency of choline and its precursor methionine in the resulting basal diet is thus the factor limiting growth and survival. To this basal ration supplements of choline, methionine, inositol, proteins poor in methionine, and proteins well supplied with methionine were added, singly or in combination, as described above.

It has already been noted that on the low-methionine choline-free basal diet death ensued within a few weeks. Necropsy revealed that the fibrosis had persisted, and extensive deposition of fat in the liver, and kidney damage, were observed. These findings in the liver were, of course, not unexpected, as it has been shown that cirrhosis may be produced, without exposure to noxious agents, by feeding somewhat similar diets.

Supplements of choline alone (Diet 5) or of methionine alone (Diet 6) in appropriate amounts permitted repair to take place to an amazing extent. The results confirm findings of others already cited—that when an adequate diet is administered to rats with a moderate degree of cirrhosis a remarkable regeneration of liver cells occurs. The presence of choline or its precursor (methionine) in adequate amounts is essential for the removal of fat and the regeneration of parenchymal cells. Under these conditions diminution in amount of fibrous tissue is also observed. The effect of methionine is presumably due to its contribution of labile methyl groups for the biosynthesis of choline.

A supplement of inositol alone (Diet 7) had no favourable effect on the deposition of liver fat or on fibrosis. The apparently lower mortality in this group compared with that in the controls may indicate that inositol exerts some beneficial effect in a manner not yet understood.

A 30% casein supplement (Diet 3), making 50% total protein in the diet, or a mixed protein supplement (Diet 4) produced results as favourable as did diets supplemented with choline or methionine. These particular high-protein diets contained sufficient methionine for growth and maintenance and also for lipotropic activity. Another high-protein diet (No. 1), containing 35% total protein but lower in methionine content, permitted good growth. The livers from this group were, however, abnormally large and fatty during the period of more rapid growth. Although regeneration of parenchymal cells was evident, fat and fibrous tissue strands were seen on gross and microscopical examination even after 12 weeks of dietary treatment. In



Diet 1; high protein, relatively low methionine. The increases in body weight, liver weight, and total liver lipid content are plotted against time. A fall in total liver lipid content did not take place until a plateau in the weight curve had been reached.

the Chart the total liver lipids are seen to increase until a plateau is reached in the weight curve, after which a rapid decrease occurs. These data, and others to be published, suggest that when limited amounts of methionine are available it is used preferentially, but not exclusively, to meet growth requirements. The methionine content of this diet, which was insufficient for lipotropic action during the period of rapid growth, was adequate for removal of liver fat after rapid growth had ceased. While all essential amino-acids were present in Diet 1 in considerably greater amounts than are usually considered adequate, methionine was present in a proportionately smaller amount. Diet 1 contains about 670 mg. of methionine per 100 g., a quantity in excess of that usually accepted as optimal for growth. Since liver lesions persisted which would presumably have been eliminated by more methionine the amount supplied was obviously inadequate under these conditions. If sufficient methionine had been available to supply labile methyl groups for the biosynthesis of adequate amounts of choline the liver damage should have been repaired. Indeed, when choline was added to Diet 1 (Diet 2) the livers of the animals appeared normal on gross examination and nearly so microscopically. These observations illustrate the important nutritional interrelationship of methionine and choline, which will now be discussed briefly.

Methionine contributes to several metabolic requirements. The significance of the fact that these different metabolic roles exist is not always sufficiently appreciated. First, certain minimal quantities have been shown to be necessary, presumably as intact molecules, for maintenance and growth. Secondly, methionine serves as a source of organic sulphur for the formation of cystine and other sulphur-containing metabolites. Thirdly, it possesses a labile methyl group, and it is this characteristic which is of greatest interest in the study of lipotropic phenomena. Dietary choline cannot substitute for methionine in either of the first two roles. Thus in any diet choline can replace only that portion of methionine which is concerned with lipotropic phenomena; conversely, methionine supplements are not available for lipotropic purposes to a maximal extent until the first two (apparently more essential) roles of methionine have been filled completely. It would appear that in rats it is only under these conditions that dietary choline and methionine are maximally interchangeable. Moreover, not all dietary choline (or choline synthetized *in vivo* from dietary labile methyl groups) is used for lipotropic purposes, since it is obvious that some is utilized to satisfy structural and other needs. Only when the moieties of dietary choline and methionine that are used for lipotropic purposes have been assessed will it be possible to estimate a factor representing their lipotropic interchangeability in any diet. Similarly, cystine and methionine are interchangeable nutritionally to a maximal extent only when the minimal methionine requirement (i.e., as intact molecule) has been met and an adequate supply of choline (or dietary labile methyl groups) is present—i.e., when the deficiency involves only the supply of dietary organic sulphur. These interrelationships have recently become more clearly defined. Neglect to consider them has led to some confusion concerning the nutritional roles (particularly with regard to lipotropic phenomena) of choline, methionine, and cystine under different dietary conditions.

The apparent disappearance of fibrous tissue from the cirrhotic livers of animals which received the lipotropic agents deserves some further comment. After 12 weeks of treatment, in groups supplemented with choline or methionine, fibrous tissue could often be demonstrated only by using special stains. Decrease in volume of individual cells may have accounted for much of this apparent disappearance, yet the change from grotesque pseudo-lobulation produced by the fibrous tissue to a more or less normal structure raises the question of actual removal of fibrous-tissue cells. This latter possibility is perhaps supported by the decrease in the number of nuclei of fibrous-tissue cells which can be seen. It should be emphasized that in our experiments the cirrhotic lesions which have been so strikingly affected by the lipotropic agents were of moderate degree and had not been present for long periods. A study of the action of the lipotropic agents on more advanced cirrhosis of long standing may be indicated, since clinicians are frequently confronted with this problem.

Certain potential clinical applications of the knowledge gained from the work on lipotropic factors, including that reported here, may be discussed briefly. Many clinical groups, stimulated in part by the findings of Patek and Post (1941), now use diets rich in protein and vitamins in the treatment of patients with cirrhosis. The favourable results which have been reported would appear to be attributable in large part to the occurrence of choline and methionine in these diets. We are not minimizing the obvious importance of inadequate amounts of minerals, other vitamins, and essential amino-acids. Estimations made in our laboratory and elsewhere show that normal diets may contain from 300 to 900 mg. of choline daily, and it may be calculated that the same rations would provide from 2 to 4 g. of methionine. If from one-fourth to one-third of this methionine were used for lipotropic purposes an additional 150 to 400 mg. of choline might be formed from it. Thus a normal diet may provide up to 1,300 mg. of available choline daily. The experimental evidence suggests that no beneficial effect in the treatment of cirrhosis should be expected from the addition of choline or methionine to a ration which is already adequately supplied with these factors—unless there should be interference with liberation of choline or methionine in the intestine or with the absorption or subsequent physiological actions of these compounds. No clinical conditions have yet been recognized in which the lipotropic actions of choline or methionine are inhibited, but this situation might conceivably exist in various diseases. However, there is convincing experimental evidence (Chaikoff, Entenman, and Montgomery, 1947) that interference with protein digestion by ligation of the pancreatic ducts or by removal of the pancreas decreases the liberation of methionine (and presumably the formation of choline). Excessive deposition of fat in the livers of duct-tied and insulin-treated depancreatized dogs has been observed repeatedly. In the depancreatized animals the progression of the lesion to cirrhosis has been followed (Chaikoff, Connor, Biskind, 1938). The clinician should therefore be on the look-out for signs of hepatic damage in cases of long-standing insufficiency of the external secretion of the pancreas.

Summary and Conclusions

Young adult rats in which a moderate degree of cirrhosis had been produced by the administration of carbon tetrachloride were placed on diets containing different amounts of the following lipotropic agents; choline, methionine, protein (containing methionine), and inositol.

None of the animals receiving only a basal hypolipotropic ration showed improvement in the cirrhosis. Deposition of fat in the liver increased, degenerative renal lesions appeared, and six of the seven rats in this group survived less than three weeks.

When adequate amounts of pure choline chloride or *dl*-methionine were added to the basal hypolipotropic diet a remarkable improvement in the gross appearance of the livers was noted within two or three weeks. After two or three months of this treatment the livers appeared normal, and on microscopical examination special stains were usually required to demonstrate any abnormal deposition of fibrous tissue. The

processes by which this fibrous tissue may disappear have been discussed briefly.

A high-protein diet, containing 35% protein but low in methionine, was not as beneficial as a ration containing 20% of similar protein to which adequate supplements of choline or methionine had been added.

A high-protein diet which contained an adequate amount of naturally occurring methionine produced results as favourable as those which were secured when suitable amounts of choline or methionine were added to diets of lower protein content.

While the experimental evidence indicates that the presence of the lipotropic agents is essential for the repair of the damaged liver under the conditions of our experiments, it does not suggest that the addition of choline or its precursor, methionine, to diets already containing adequate amounts of these factors will enhance the therapeutic effect unless some interference with the absorption or action of the lipotropic agents exists.

No evidence has been secured that inositol exerts a favourable effect on experimental cirrhosis.

On the basis of the experimental findings it is suggested that the favourable clinical results which have been obtained in patients with liver damage when an effective therapeutic diet is provided may be attributable in large part to the lipotropic factors which the diet supplies.

We wish to express our thanks to our colleagues Dr. Jessie H. Ridout and Dr. W. Stanley Hartroft for their generous assistance in certain aspects of this work. The expenses of these studies were defrayed in part by a grant from the Banting Research Foundation.

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When Mr. Bevan opposed the proposal to limit the opening of new pharmaceutical units it was dropped. "This half-hearted attitude does not augur well for the future," Mrs. Jean K. Irvine, President of the Pharmaceutical Society of Great Britain, told its annual general meeting. "The consequences remain to be seen, but one of the main causes of unsatisfactory conditions in pharmacy will continue to operate and, other things being equal, will have the same results." The proposal that the manager of a pharmacy as well as the owner should participate in the contract under the National Health Service had also not been further pursued, she said, when the Minister indicated his opposition. The manager was dependent on his employer for furthering his point of view, and it was not necessary to attribute a hostile attitude to employers to realize how unsatisfactory it was that approximately half the pharmacists taking part in the Service would be denied the status their qualification and responsibility deserved.

PNEUMOCONIOSIS OF COAL-MINERS*

BY

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Director, Pneumoconiosis Research Unit, Medical Research Council

[WITH PHOTOGRAVURE PLATE]

The investigations of the Pneumoconiosis Research Unit have of necessity had a practical or *ad hoc* bias. There are many fundamental points of pathogenesis, of physiology, of cellular pathology, and so forth which remain obscure in coal-miners' pneumoconiosis, but, initially at any rate, we have had to set these points on one side and to seek information in the light of which appropriate administrative action might be undertaken in order to deal with the vast human and economic problems caused by the disease.

In South Wales, by the end of 1945, 12,000 men had been certified and new cases were still being certified at the rate of 100 a week. Nearly two-thirds of them were under 50 years old; one-quarter were under 40. The majority were coal-hewers, the most skilled class of mine workers. They found themselves, at an age when family responsibilities are at their heaviest, cast out of their accustomed work, with no training for alternative employment, and with weekly compensation amounting at most to £3 5s. for an unemployed man with a wife and three children. If the man obtained work his weekly compensation was reduced according to his earnings. No special system of treatment or after-care existed.

Post-mining Employment

Our first investigations, carried out under the supervision of Dr. Alice Stewart, were directed to studying these social problems. We asked the Social Survey to assist us, and during February, 1946, they carried out an inquiry, by house-to-house visits, into the post-mining employment of a one-in-ten sample of all the men who had been certified in South Wales before January, 1945. We also obtained a full employment history from the men whom we invited to attend for the clinical and radiological examinations which will be considered later. Lastly, we instituted inquiries at factories which were employing men with pneumoconiosis† in order to study the industrial performance of these men.

Generalization concerning the re-employment of men with pneumoconiosis is difficult because of the wide variety of the types of case to be considered. They range from young men with minimal disability to elderly men who are breathless at rest. However, 86% of the cases fall between the ages of 30 and 60, when any man should have a job, and there are two other important factors common to nearly all of them. They have all spent their adolescent and early adult years in coal-mining, at which they have become skilled, but they have no training for other forms of skilled employment, and they are, by reason of their breathlessness, incapable of undertaking strenuous physical exertion.

Bearing these points in mind, we may consider certain relevant statistics concerning the post-mining employment of certified cases of pneumoconiosis. Chart IV shows the percentage of the men in the Social Survey's sample of certified cases of pneumoconiosis and among all insured men and boys in South Wales who were employed each year between 1936 and 1946. It will be seen that under

*The second Goulstonian Lecture, given at the Royal College of Physicians of London, on Jan. 15. Lecture I appeared in last week's issue.

†In this paper the word pneumoconiosis includes silicosis.

conditions of full employment, such as existed in South Wales in the later years of the war, nearly 70% of the certified men found work; but that in the pre-war years and again in 1946, when the Royal Ordnance factories and other wartime industries were closing down, only 30–40% were employed. The contrast between the effect of scarcity of jobs on the employment figures for cases of pneumoconiosis and on those for normal workmen is striking, but it must be remembered that the two groups have not been standardized for age.

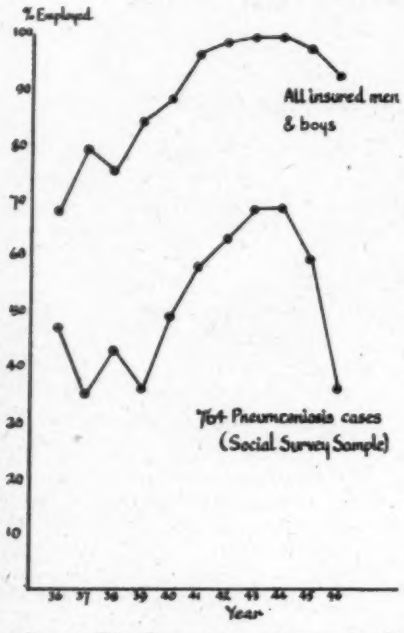

CHART IV.—Percentage of men in S. Wales employed each year, 1936–46. The 764 certified cases of pneumoconiosis are a 1 in 10 sample of all cases certified before January, 1945.

Of those men remaining unemployed at the peak of employment 60% stated that they had not sought work either because of ill-health or because of old age. Thus under conditions of full employment some 20% of men certified with pneumoconiosis desired work but were unable to secure it.

Chart V illustrates the problem of re-employment of cases of pneumoconiosis between 1937 and 1946 in another way. It concerns all the men who were examined clinically (see below) and who were certified before 1940. The cases have been divided into those over and those under the age of 50 at the time of certification, and within these age groups they have been further divided into cases certified as Stage 1 silicosis, and those certified as Stage 2 and 3 silicosis.‡ It will be seen that the older men were very much less often employed than the younger men, but that in neither age group did the disease stage at certification have such an obvious influence on employment. The intermittent nature of the employment obtained by many of these men is also shown, and the infrequency of employment before and after the war relative to the wartime years is again evident.

When we considered the types of jobs obtained by these men (Chart VI) we found, in the Social Survey's analysis, that they were largely labouring, pedestrian, and bench-work jobs. Among the men whom we examined clinically the jobs were classified into skilled, semi-skilled, and unskilled. It will be seen that only a small minority of the men obtained skilled work. Thus the greater part of these skilled ex-coal-miners had to be content with unskilled

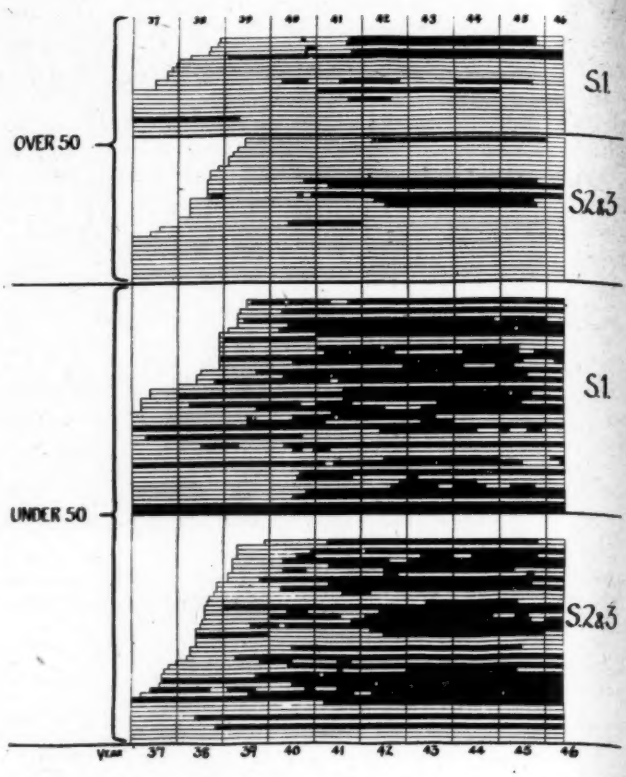

CHART V.—Employment from 1937 to 1946 among a group of men in South Wales who were clinically examined and who were certified before 1940. They have been divided into those over and those under the age of 50 at the time of certification, and into those certified as Silicosis Stage 1 (S.1), Silicosis Stage 2 and 3 (S.2 and 3). Each line represents the employment history of a single man. Blank portions = unemployed; solid portions = employed.

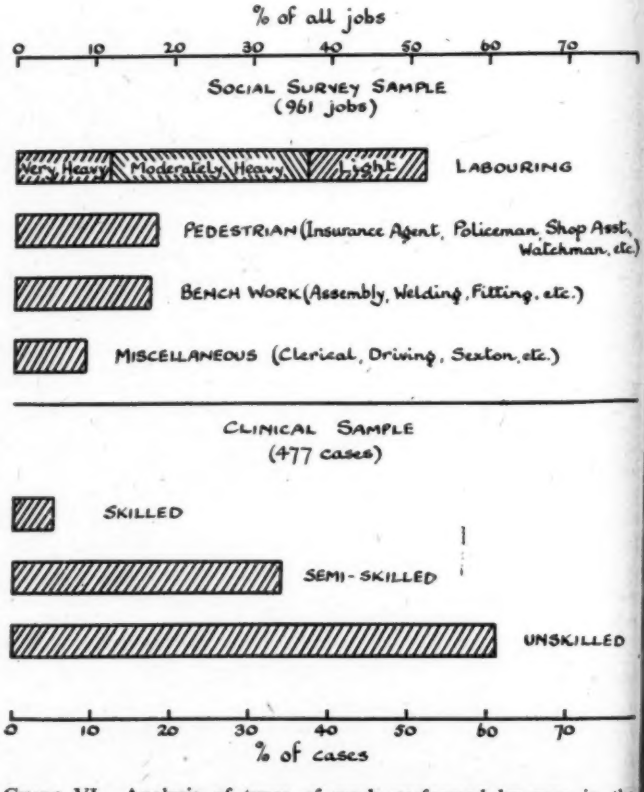

CHART VI.—Analysis of types of work performed by men in the Social Survey sample and in the clinical sample.

‡The classification used by the Silicosis Medical Boards is the following: The first stage is defined as being characterized by radiographic appearances not less than the presence of nodular shadows, together with an increase of hilum shadows, linear shadows, and pulmonary reticulum, with or without impairment of capacity for work. The second stage is characterized by an increase in the area of the nodular shadows and a tendency to the confluence of the individual nodules, and the presence of some degree of impairment of capacity for work. The third stage is considered unnecessary to define, but it implies a condition equivalent to total incapacity for work. Third-stage films show massive consolidation.

work, and often with labouring, for which by reason of their disability they were least suited.

Only just over half of the men said that they regarded their present or most recent job as suitable. Among the remainder the most common objection was that the work was too heavy, with long hours and exposure to fumes and dust as the next most frequent objections.

The efficiency with which an ex-miner disabled by pneumoconiosis performs a job in light industry is not easily assessed—partly because of the great diversity both of the population under consideration and of the available types of jobs, which renders misleading a statistical analysis based on a small sample, and partly because of the difficulty of choosing any satisfactory quantitative measure of efficiency. Mr. Treasure, an economist working with the Unit, made an analysis of attendance records at two factories employing pneumoconiosis cases in light assembly, welding, and store-keeping, in which it was possible to make a comparison between groups of 50 cases of pneumoconiosis and 50 controls at one factory, and between groups of 24 at the other (Table IV). In both these factories the sickness and unauthorized absence rates for the two groups were observed during the first eight months of 1946. It was found that men with pneumoconiosis had significantly higher unauthorized absence rates than normals; they also had higher sickness absence rates, though the difference here was significant only at one factory. In the factory where the larger groups were investigated the cases of pneumoconiosis could be divided into those receiving weekly compensation (whose level is reduced according to the level of earnings) and those who had settled their compensation for a lump sum. This comparison showed a significantly higher unauthorized absence rate in the former than in the latter group. This emphasizes the unsatisfactory consequences of a system of compensation which places a premium on idleness. That these differences were attributable to pneumoconiosis and not to the different industrial backgrounds of the workmen is suggested by Treasure's having found that at a large service stores depot a similar study of ex-miners without pneumoconiosis and a control group without mining experience showed no difference between the absence rates in the two groups.

TABLE IV.—*Average Hours Lost from Work during January to September, 1946, by Groups of Pneumoconiosis Cases and Normals (Treasure, 1948)*

Group	Factory 1 (50 in each Group)			Factory 2 (24 in each Group)	
	Sickness Absence	Unauthorized Absence		Sickness Absence	Unauthorized Absence
		Total	Compensation Class		
Pneumoconiosis	63·5	**54·7**	Settled **42·9** Weekly **57·1**	**117·0**	**18·6**
Control ..	43·6	**32·6**	—	**43·4**	**14·3**

Group	Store Depot	
	Sickness Absence	Unauthorized Absence
Ex-miner (healthy) ..	26·9	20
Control	34·4	19·8

Pairs of figures between which the difference is significant appear in black type.

Too much weight must not be placed on this small-scale study. Moreover, although a low absence rate from work is an important criterion of industrial performance it is not a measure of efficiency at work. Treasure also sent a questionary to 150 firms in South Wales asking for the employers' opinion of cases of pneumoconiosis as workmen. Replies were received from 92 firms, of which 44 had had experience of men with pneumoconiosis as employees. The replies were strikingly uniform in expressing complete satisfaction with the performance of these men so long as they were not asked to undertake strenuous work or heavy lifting.

In summary and with some simplification our views on the post-mining employment of the certified case of pneumoconiosis are the following: If conditions of full employment or labour shortage can once more be reached in South Wales a high proportion of certified cases of pneumoconiosis will find employment. But the skilled jobs outside coal-mining will still be filled by men trained for them from their youth, and the lighter jobs in the factories, run by private industrialists who must cut their costs, will be filled by cheaper female labour. The man with penumoconiosis will still be forced, as he was during the war, to take up unskilled work, which will as often as not be unsuitable chiefly because most unskilled work is heavy work. Some form of special provision must be made.

In October, 1945, a "working party" under the chairmanship of Mr. D. R. Grenfell, M.P., spent a fortnight in South Wales considering this problem. They recommended (Ministry of Fuel and Power, 1945) the building of ten special factories for light industries in which employers were to be encouraged to employ partially disabled cases of pneumoconiosis by being granted reductions in rent if they did so. In this way it was hoped that employment would be provided for 100 cases at each factory or for 1,000 men in all (out of a total number of 17,000 men to-day). Now, two years later, although all these factories are under construction, none has yet been completed, so that we cannot say whether the bait of rent reduction will be sufficient to obtain preference for cases of pneumoconiosis over female labour, and whether these ex-miners will be given a chance of developing a skill such as that which they developed in their former occupation and without which they will remain dissatisfied.

We fear that the man with pneumoconiosis will continue to stand at the end of the queue for the lighter and more skilled jobs unless some special scheme of retraining, and if necessary State-subsidized employment, are provided. The National Coal Board (1947) has expressed its intention of providing employment for its disabled employees in the ancillary industries of coal-mining, such as the making of mining machinery. This would be an ideal solution, but under present circumstances it is remote. It would, however, be possible to re-employ many certified men, even under existing legislation, in certain occupations within the industry both on the surface and even underground, but this possibility is not widely recognized, and little or nothing is being done at present to help the men in this way.

But no matter how good the provision of normal employment may be, a residue of some 20–30% of the men will remain unemployed, largely because they feel too old or too ill for ordinary work; and they will sit at home unhappily doing nothing, but "waiting for the undertaker," as they often say. We have observed a number of these older and iller men as in-patients. We have found how unhappy they are sitting at home all day doing nothing. They often live in precipitous streets along which a dyspnoeic man dare not venture. If you live in a house at the top of a hill, and if you cannot even manage a single flight of stairs without a pause, a bus at the bottom of the hill which might take you to work is beyond your reach. We have found these men surprisingly adept in learning simple handicrafts. One man, aged 56, breathless at rest, had done no work for six years before he entered our ward. He learnt leather work, and has made a profit of £30 in four months since his discharge by selling leather goods which

he made at home. We believe that there is a need for the organization of home industries either at local labour clubs or actually in the men's homes, by which these men might feel that they are making some contribution for the common good and that they are not outcasts, disabled in the winning of coal and now forgotten. An excellent example of this type of provision is set by the settlement at Maes-yr-Haf, in the Rhondda Valley. It is an example which should be followed. There must be no atmosphere of State-run charity. We cannot ask men to enter the hazardous occupation of coal-mining unless we can assure them that proper provision will be made for their needs if they are disabled.

Radiological Progression after Certification

The social or economic problems which face men certified with pneumoconiosis cannot be considered in isolation from their clinical condition. We need information in order to guide us in the prescription of methods of treatment and rehabilitation, and we also need to know whether the disease is arrested or whether it continues to progress after a man has been suspended from underground work. Hart and Aslett postulated that progression from reticulation or major consolidation was associated with continued exposure to dust, at least in high-incidence mines. Since their studies were confined to men who were still working they could provide no evidence on the effect of removal from such exposure. One object of the suspension of certified men from the industry, however, is to prevent progression, and we found there was a widespread belief that this object was achieved in most cases, although it was known that men in the later stages of the disease might progress after leaving the pits.

In order to study this question Dr. Alice Stewart invited a sample of men who had been certified before January, 1945, 650 in number, to attend at Cardiff for clinical and radiological examination. The sample was drawn partly from the high-incidence steam-coal area in East Glamorgan and Monmouthshire and partly from the anthracite area. It was chosen to be representative of interval since certification, of age, and of disease-stage at the time of certification. By the courtesy of Dr. Sutherland, Chief Medical Officer of the Silicosis Medical Boards, we had access to each man's *x*-ray film taken at the time of certification, so that we were able to assess progression by comparing in each case the first film with that which we took ourselves. We also made a full clinical examination and carried out a vital-capacity estimation, an exercise-tolerance test, sedimentation rate, haematocrit, and sputum examination in every case.

Dr. Stewart will soon be publishing a report of her findings (Stewart, 1948). I propose to confine my discussion to the nature and progression of the disease as we have observed it, particularly in the light of a more detailed analysis of the radiographs recently carried out by Dr. Idris Davies and Dr. K. J. Mann (1948). We found that progression after suspension from the industry is very common; but it is a slow process, and an interval of at least five years is usually needed to reveal it. I shall therefore consider only those who have been removed from exposure to dust for five or more years. Since all these men had been certified before the operation of the coal-miners' pneumoconiosis scheme, we did not expect to find any cases of reticulation, but the distinction between reticulation and nodulation is not always easy, and in fact there were several cases which we considered to show only reticulation.

Most of these cases of reticulation remained stationary after leaving exposure to dust, but a minority developed localized areas of coalescent mottling, usually in the upper zones, and more commonly on the right than on the left. Once this appearance had developed, progression onwards to fluffy and massive shadows was the rule. An intervening stage of generalized nodulation was not seen, although a few cases of reticulation did develop nodular shadows. Cases of diffuse nodulation appeared to behave similarly to cases of reticulation, but with a rather greater tendency to advance by coalescence of nodules to the formation of massive shadows.

These changes are perhaps best illustrated by one case in which we were able to obtain intermediate radiographs between the earliest and the most recent. This man was a steam-coal collier when, in 1941, at the age of 34, an attack of pain in the chest while at work led him to apply to the Silicosis Board. His radiograph then (Plate, Fig. 4) showed reticulation in both lung fields, but in the outer half of the right upper zone there was coarser mottling. He was rejected by the Board and went into the Army. A further attack of pain in the chest led to his being *x*-rayed and discharged from the Army as a case of silicosis. He reapplied to the Board and was certified, his radiograph (not shown) being little changed except for a definite increase in the coarser mottling in the right upper zone. A year later a further radiograph was taken (Fig. 5). There is now an obvious fluffy shadow in the right upper zone and coarse mottling is apparent in the left first and second spaces. Three years later we saw him, and his radiograph (Fig. 6) then showed a large massive shadow in the right upper zone and a fluffy shadow in the left upper zone.

The fact that I have taken a steam-coal collier as an example is immaterial. Dr. Stewart was unable to find any difference between the disease as it appears in steam-coal and in anthracite colliers.

Pathologically, cases of reticulation and nodulation show diffuse non-collagenous coal nodulation, with or without focal emphysema (see below), although in some cases with radiological nodulation typical whorled silicotic nodules may be found. The progressive coalescent shadows are due to the presence of collagenous nodules, which may fuse to form large areas of dense coal-impregnated collagenous fibrosis. To this quite distinct condition we have applied the term "progressive massive fibrosis." It should be noted that the radiological reticulation and the underlying coal nodulation are both generalized throughout the lungs, whereas progressive massive fibrosis develops locally. This lends support to Belt and Ferris's contention that some sporadic factor other than dust is responsible for its development.

When we come to consider the frequency with which these changes are found we are in difficulties, because a considerable number of the men certified more than five years before we made our survey had died during the interval and we could obtain no evidence concerning the progression of these fatal cases. Thus Dr. Stewart found that about 15% of the men certified with first-stage silicosis and 40% of those certified with second- and third-stage

TABLE V.—*Radiological Progression of Certified Cases with no Dust Exposure between their Two Radiographs. (Stewart, 1948; modified by Davies and Mann, 1948)*

Initial *X*-ray Stage	No. of Cases	*X*-ray Stage 5–14 Years after Leaving Underground Work				% with P.M.F. Appearing or Advancing
		Reticulation	Nodulation	Progressive Massive Fibrosis		
Reticulation	26	18	3	5		19
Nodulation ..	24	3	11	10		42
				Stationary	Progressed	
Progressive massive fibrosis ..	290	—	—	36	254	88

silicosis die within five years of certification. Presumably the fatal cases progressed more rapidly than the survivors, so that our figures based on survivors are certainly unduly favourable, especially in the more advanced cases.

Table V is a simplified summary of our findings in cases with an interval of at least five years between certification and our examination, the maximum interval being 14 years. It will be seen that the vast majority of cases which at the time of leaving exposure to dust had already developed some degree of progressive massive fibrosis advanced further in the course of time, whereas the majority of cases with diffuse reticulation or nodulation remained stationary.

Radiological Progression under Dust Exposure

Having, rather to our surprise, observed this frequent progression in men who had been removed from exposure to coal dust, it was only natural that we should seek to discover in what way further exposure to dust might effect progression, especially in the earlier stages of the disease.

We were fortunate in having all the radiographs of working colliers taken by Hart and Aslett between 1938 and 1940. We found that approximately half of these men were still working underground, the remainder having left the industry for various reasons at various times. Davies and Mann have followed up a sample of these cases, all of whom continued to be exposed to dust underground for some period after their first *x*-ray examination. They have assessed progression in the same manner as in the certified cases by comparing the film taken by Hart and Aslett with their own film taken six to nine years later. The analysis of their findings is in its early stages, so that no final quantitative results can be given, but certain preliminary conclusions may profitably be considered. (1) The interval with which we are dealing—namely, seven to nine years—is sufficient for definite progression of reticulation to become manifest in those who have continued to work underground for the whole period, although only one or two who were normal in 1938 have since developed a certifiable degree of reticulation. (2) Men who have a certifiable degree of reticulation may continue at work at the coal-face even in a high-incidence mine for a period of seven years without detectable progression. (3) On the other hand, some men who had simple reticulation in 1938 and who have continued at work at the coal-face without symptoms have since developed large areas of progressive massive fibrosis.

The question is whether the development of progressive massive fibrosis is more frequent or less frequent in those men who remain at work exposed to dust than in those who are certified and leave the mines. Table VI gives a preliminary quantitative analysis of the progression shown by all the men in the Hart and Aslett series who had sufficient disease to have justified certification in the first *x*-ray film and who are thus radiologically comparable to Dr. Stewart's cases (Table V). The two series of cases, however, are not standardized for age, nor are intervals between the two films identical in the two series, although the mean interval in two groups is not very different. A rough comparison between the two series should therefore probably be permissible. The important distinction between the two series is that the Hart and Aslett cases continued to be exposed to dust underground in high- or medium-incidence mines for at least part of the interval between the two *x*-ray films, while the certified cases all left underground work after the first *x*-ray film. Despite this difference the proportions in the different initial *x*-ray categories showing advance into or within the progressive massive fibrosis category are very similar in the two series. It should be noted that these figures refer only to the number of cases showing progression in the different groups. A comparison between the rate of progression in those leaving and those remaining at work underground has yet to be made.

TABLE VI.—*Radiological Progression of "Certifiable" Hart and Aslett Cases. All these Cases were Exposed to Dust for at least some of the Interval Between their Two Radiographs*

Initial *X*-ray Stage	No. of Cases	*X*-ray Stage 7–9 Years after First *X*-ray Examination				% with P.M.F. Appearing or Advancing
		Reticulation	Nodulation	Progressive Massive Fibrosis		
				Stationary	Progressed	
Reticulation	158	118	6	34		22
Nodulation ..	11	—	7	4		36
Progressive massive fibrosis ..	56	—	—	7	49	88

The results of these two radiological surveys suggest strongly, then, that the development of progressive massive fibrosis is due to some factor other than additions of further dust to the lungs.

Nature of Progressive Massive Fibrosis

What, then, is the nature of this progressive massive fibrosis? There are four sources of evidence to which we may turn for an answer to this question.

1. Clinical Evidence

This is not a very helpful source of information. The development of progressive massive fibrosis is associated with a steady increase of dyspnoea or cough and often with no other consequences. The man remains fit in appearance when at rest, although breathless on exertion, until a late stage. Finally, wasting and a sallow look or oedema of the ankles suggest that the end is not far distant, but it is not easy to distinguish wasting due to the economic from that due to the physical consequences of the disease. Physical signs are remarkable more by their absence than by their diagnostic value, and when present they are usually indistinguishable from those found in any case of chronic bronchitis.

The chief point of interest that Dr. Stewart has found lies in disturbances of the sedimentation rate. Table VII shows the relationship in certified cases between an abnormal sedimentation rate, taken by the Wintrobe method, and radiological progression. In this table the type of progression has been divided into marked, slight, and no progression. In the most progressive group (those showing marked extension in less than five years) 86% have an abnormal sedimentation rate (10 mm. or over in 1 hour), while in those remaining stationary for more than five years 85% have a normal sedimentation rate. In the intermediate groups (those with slower progression or those in whom progression may be starting but is not yet radiologically evident) cases with abnormal sedimentation rates appear in intermediate proportions. Here, then, we have a hint that we may be dealing with an infective process, and it is natural to turn to the bacteriologists for help.

TABLE VII.—*Relationship between Sedimentation Rate and Progression of Progressive Massive Fibrosis (Stewart, 1948)*

Degree of Radiological Progression	Percentage of Cases with Raised and Normal Sedimentation Rates			
	Under 5 Years' Interval between Radiographs		Over 5 Years' Interval between Radiographs	
	E.S.R. Normal	E.S.R. Raised	E.S.R. Normal	E.S.R. Raised
Nil	58 (87)	42 (63)	85 (71)	15 (13)
Slight	19 (14)	81 (61)	36 (28)	64 (49)
Marked	14 (8)	86 (50)	33 (65)	67 (132)

Figures in parentheses are the actual numbers on which percentages are based.

2. Bacteriological Evidence

In classical silicosis, due to exposure to dusts containing a high proportion of free silica, progression after leaving exposure

to the dust is almost invariably due to the activity of the tubercle bacillus, although other pulmonary infections in a silicotic lung may leave excessive fibrosis in their wake (Strachan, 1948). In repeated bacteriological examinations of sputa from some 50 of our in-patients we have been unable to find any characteristic flora or any feature other than the presence of coal to distinguish these sputa from that produced by any case of chronic bronchitis, nor has there been excessive residual fibrosis in the few cases of pneumoconiosis in which we have been able to observe the development and resolution of a non-tuberculous pulmonary infection. Our attention has therefore been concentrated on the hypothesis that progressive massive fibrosis is the consequence of tuberculous infection in a lung already occupied by siliceous coal dust.

In Dr. Stewart's series 465 cases (the majority with progressive massive fibrosis) produced specimens of sputum. By the courtesy of Prof. G. S. Wilson, these were examined in Cardiff by Dr. L. Dowsett, of the Public Health Laboratory Service. There were only 17 (3.5%) in which she was able to isolate the tubercle bacillus on culture or guinea-pig inoculation. Sen (1937) found 12 out of 100 cases of pneumoconiosis in South Wales coal-miners with a positive sputum, but it is not clear how his cases were selected and how comparable they are to Dr. Stewart's. Although Dr. Stewart found that the cases with positive sputum were not usually radiologically different from the others, they did differ in that they appeared more ill.

We have observed 183 cases in various stages of the disease as in-patients. Of these, 8 (4.5%) have had a positive sputum. These positive cases had in common that they were ill men and they were all febrile at least for a few days during admission, whereas we have only occasionally observed fever in the sputum-negative cases, and then it was caused by obvious intercurrent infection. The serious significance of clinically recognizable tuberculosis has also been stressed by Gooding (1946).

Not infrequently cavitation occurs in areas of progressive massive fibrosis, an event which is usually associated with the classical history of coughing up a large amount of dense black sputum. We have had 15 cases of such cavitation under observation for several weeks as in-patients. It might have been expected that if progressive massive fibrosis is tuberculous in nature we should obtain positive sputum results from these cases. Dr. Dowsett has examined their sputum repeatedly by culture and by guinea-pig inoculation, but from only four of them (27%) could she isolate the tubercle bacillus.

Evidence from clinical bacteriology therefore suggests that these lesions are not essentially tuberculous but that they may be complicated by tuberculosis without modification of the radiological appearance, though usually with a change for the worse in the clinical picture. It is almost as if the invasion of the tubercle bacillus was but a terminal event.

Post-mortem bacteriology tells a rather different story. Dr. Enid Rogers (1946) has reported that she had evidence of tuberculosis in 75.8% of her cases of massive fibrosis at necropsy. In 1947 in a smaller series of 20 cases Dr. Sladden observed a similar proportion. However, Gooding (1946) found evidence of tuberculosis in only 26% of cases at necropsy, but he does not say how many of his cases had massive fibrosis. Dr. James, of our Unit, working under Dr. Gough's guidance in the Welsh National School of Medicine, has made a routine search for tuberculosis, by culture and guinea-pig inoculation, in 75 successive cases of massive fibrosis coming to necropsy, but has had a positive result in only 25 (30%).

3. Histological Evidence

I have already referred to Belt and Ferris's suggestion that the development of collagenous fibrosis in coal-miners' lungs is due to the operation of a "sporadic factor *x*," which might be tuberculosis. Theirs was apparently the first definite suggestion of such a point of view in coal-miners' pneumoconiosis. Cummins and Sladden (1930) and later Cummins (1935) had attributed this collagenous fibrosis to the action of silica or to the accretion of siliceous coal dust into an area of pre-existing infective fibrosis. On the other hand, Policard (Policard *et al.*, 1939) has always maintained that collagenous fibrosis is of tuberculous origin in silicosis.

Our understanding of the pathology of coal-miners' pneumoconiosis has been considerably increased by the work of Dr. J. Gough, of the Welsh National School of Medicine, whose observations may conveniently be considered at this point. His first paper, in 1940, was concerned with the pathology of the disease in coal-trimmers, who load coal into the holds of ships. He showed that the condition was identical with that appearing in coal-miners, and that, since the trimmers work in an atmosphere heavily charged with nothing but coal dust, this dust must be regarded as fibrogenic. In agreement with Gardner (1933), Badham (1938), and Cummins (1938) he pointed out the emphysema which accompanies the disease. Gough (1947a) and J. E. Wentworth then developed a method of cutting sections of the whole lung which may be mounted on paper and viewed by the naked eye in order to make a side-by-side comparison between the pathological condition and a radiograph taken before death. This technique brought into prominence the focal nature of the lesions underlying radiological reticulation, which Gough called coal foci, thus disagreeing with Belt and Ferris's description of diffuse "dust reticulation," although he agrees that occasionally a diffuse type of coal infiltration of the lung is seen. Some of these foci are soft and impalpable, but others are hard and nodular. He also demonstrated clearly the distribution and severity of the emphysema lying in the immediate vicinity of these coal foci, for which he used the term "focal emphysema" in order to differentiate it from the large bullous type of emphysema which develops with the contraction and scarring caused by the larger areas of massive fibrosis and also from the emphysema of chronic bronchitis and asthma in non-miners. This focal emphysema, he suggested, was the most likely cause of the dyspnoea associated with reticulation and might be of fatal severity. He pointed out that this focal emphysema is not proportionate to the degree of fibrosis and is more severe in coal-miners than in cases of classical silicosis with typical collagenous nodules. A detailed account of the development of the coal focus has recently been published by Heppleston (1947), in which he attributes the development of focal emphysema to mechanical stress in the alveoli surrounding the coal nodules. Williams (1944), however, believes that the emphysema is due to stenosis of the respiratory bronchi as they pass through the coal foci.

Gough (1947b) supported the suggestion of Belt and Ferris that tuberculosis might be the agent responsible for the development of collagenous fibrosis. Indeed, he suggested it was the chief if not the sole agent. He drew a distinction between the simple coal foci and other quite distinct collagenous nodules which he called infective. Such nodules may occur discretely but are most often found in the early stages of the formation of massive fibrosis and at the periphery of such areas. They may be distinguished from the classical collagenous, whorled silicotic nodule which is found in men who have worked predominantly in rock.

Gough argues that the histology of the lesions in which tubercle bacilli can be identified and from which they can be isolated by culture is indistinguishable from the histology of lesions in which tubercle bacilli cannot be found, and that it is therefore reasonable to assign a common aetiology to all of them and to assume that the negative cases are those in which the initiating tuberculous process has died out. Moreover, there is nothing in the obviously tuberculous lesion to support the clinical suggestion that the tuberculosis is a later complication of a pre-existing non-tuberculous fibrosis. It appears as an integral part of the disease process.

4. Radiological Evidence

The radiological appearance of the earlier stages of progressive massive fibrosis is often similar to that of tuberculous infiltration. Davies and Mann (1948) have made a detailed study of these early shadows and consider that they may be divided into three groups.

1. Cases in which the appearance is *typically tuberculous*.—The localization is apical, with a segmental distribution, often with a pleural reaction and with increased vascular markings converging downwards to the hilum. The focal shadows within the lesion are dense and do not show the granularity typical of the mottling of reticulation or non-infective coal nodulation.

2. Cases in which the appearance is *ambiguous*.—Tuberculosis is still suggested; the location is subapical, but often rather lower; there is a gradual transition from the granular mottling of the generalized dust effect to more homogeneous but still somewhat granular foci which are not of segmental distribution. There is little pleural reaction or increase of vascular shadows running to the hilum (e.g., Plate, Fig. 4, right upper zone).

3. Cases in which the appearance is *characteristic of progressive massive fibrosis*.—The shadows are subclavicular, but may lie in the lower zones. They are well separated from the periphery. At first they are composed of a coalescence of the typical granular mottling of the generalized dust lesion; later they form compact homogeneous masses (e.g., Plate, Fig. 6).

Among the Hart and Aslett cases that Davies and Mann have reviewed there were 147 that showed one or other of these types of localized shadow in addition to some degree of reticulation in either their past or their present films. Table VIII shows the types of progression they observed in these cases.

TABLE VIII.—*Development and Progression of Localized Shadows in all Hart and Aslett Cases that Presented such Shadows in either the First or Second X-ray Film (Davies and Mann, 1948)*

Type of Shadow in First Film	Type of Shadow in Second Film			Totals
	Tuberculous	Ambiguous	Progressive Massive Fibrosis	
Reticulation only	8	47	13	68*
Tuberculous (+ reticulation)	22†	0	1	23
Ambiguous (+ reticulation)	0	35‡	21	56

* Out of 461 cases in the whole series showing some degree of reticulation in the first film (169 of them certifiable).
† 9 of these cases had advanced; 13 had remained stationary.
‡ 28 of these cases had advanced; 7 had remained stationary.

The main points to notice in this table are: (1) When a tuberculous shadow is present in the first film it nearly always retains its characteristic appearance even in the presence of reticulation. In one case, however, a typical shadow of progressive massive fibrosis developed at the site of a typical tuberculous shadow, and this sequence of events has also been observed in a few other cases not included in this particular series. (2) The ambiguous shadows either remain ambiguous or develop into characteristic progressive massive fibrosis. (3) New shadows appearing in the second film in cases of reticulation are usually of the ambiguous type or characteristic of progressive massive fibrosis, but it is possible for a characteristic unmodified tuberculous shadow to appear in the presence of pre-existing reticulation.

Although the tuberculosis in this particular series showed a very benign type of progression we do see cases of reticulation with a superimposed rapidly progressing extensive tuberculosis.

Summing up all this evidence, then, we may say that, clinically, tuberculosis appears as an infrequent but often serious complication of the disease; pathologically, it appears to be the probable cause of most cases of progressive massive fibrosis; radiologically, when it can be identified, it usually runs an independent unmodified course, but in the presence of reticulation it may occasionally be seen to become modified and develop into typical progressive massive fibrosis.

Synthesis of Present Evidence

With this conflicting evidence is it now possible to achieve any synthesis and to produce some provisional hypothesis both to interpret the observed facts and to provide a basis for action and for further investigation?

I have attempted to represent in the accompanying Diagram our present views on the nature of this disease. Any man receiving an adequate dosage of coal dust and in whom the natural means of elimination are overwhelmed may develop coal nodulation. One consequence of this in certain cases will be the development of focal emphysema. We do not know why only certain cases develop this complication. We cannot diagnose it in life, but it appears to be uncommon except in the more elderly cases. It may become severe enough to be fatal.

Another consequence of coal nodulation is the liability to develop progressive massive fibrosis. We believe that the development of this complication may depend upon an adequate silica content of the dust and that it is due to the action of some infective agent which may be tuberculous, although tuberculosis may often pursue an independent course in the presence of reticulation. Depending perhaps upon the resistance of the patient, but also upon the silica content of the dust, progressive massive fibrosis may follow

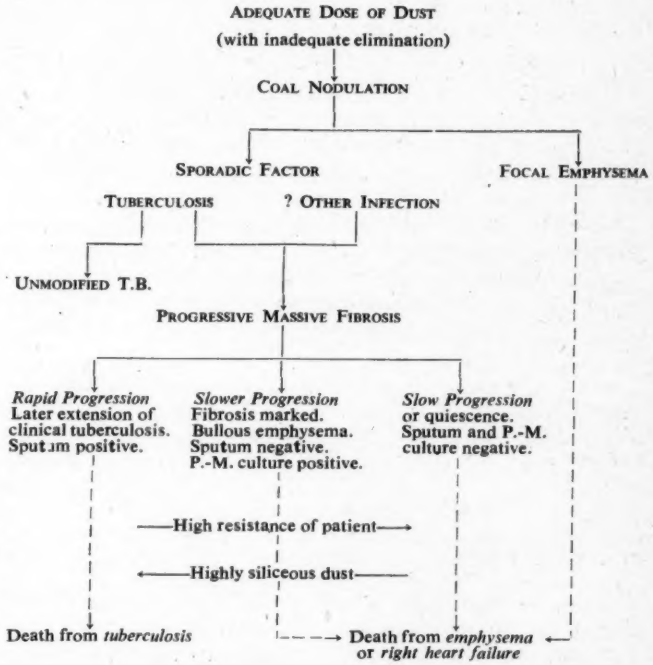

Diagram showing proposed scheme of progression of coal-miners' pneumoconiosis. (For details see text.)

three different types of course. (*a*) There may be rapid progression with the ultimate development of clinically recognizable tuberculosis and a positive sputum. Such cases die from their tuberculosis. (*b*) The progression may be slower, with the formation of masses of fibrous tissue which on contraction are associated with the development of bullous emphysema. Such cases are not clinically tuberculous, but from their lesions the tubercle bacillus may be cultured post mortem. They commonly die from their emphysema with right heart failure. (*c*) In certain cases we see very slow progression which may attain a state of quiescence. In such cases the tubercle bacillus cannot be recovered post mortem, but death is often due to the pneumoconiosis.

Our views on the nature of coal-miners' pneumoconiosis therefore lead us to talk of three diseases. There is the pure coal-dust disease, non-progressive and benign unless focal emphysema develops, when it may be fatal. In this respect it is a more serious condition than the second disease, the classical non-infective silicosis of rock-workers, in which focal emphysema is much less prominent. In coal-miners these two diseases are often indistinguishably combined. Then there is a third disease process due to the interaction between some infective process, often tuberculosis, and the dust ensnared in the lung. The fundamental similarity of coal-miners' pneumoconiosis to pure silicosis is close. We believe the differences must be due, as Cummins (1934) maintained, to some action of the coal dust in the lung in subduing the toxic effects of tuberculosis both generally

and locally, so that it is not clinically apparent, and so that the bacilli only occasionally escape from their fibrous prison to spread throughout the lung or appear in the sputum. The clinical differences between coal-miners' pneumoconiosis and silicosis are chiefly that the coal-miner with his focal emphysema and his anthraco-silico-tuberculosis is more breathless than ill and his death is like that of a chronic bronchitic with emphysema and right heart failure. He has, as Cummins has emphasized, miners' dyspnoea or miners' asthma. On the other hand, the silicotic with silico-tuberculosis is more often ill as well as dyspnoeic. He has miners' phthisis, and dies of clinically recognizable tuberculosis.

Prevention: Periodical Examinations

Having now outlined the observations that we have made on the progression and nature of this disease, the question of treatment needs consideration.

The most important preventive measure is of course dust suppression, but it may be ten years before we can properly assess the efficacy of dust suppression in reducing the incidence of the disease. For this reason some other immediate preventive measure is needed. This can be provided only by a system through which men can be removed from a dangerous environment before they have developed a significant amount of disease.

At present certification has this aim; but it is failing, for after certification the majority of men undergo serious progression. Since it is left to the initiative of the man to apply for certification, and since the early stages of the disease right up to progressive massive fibrosis may be symptomless, the present system is bound to fail. It is therefore necessary to institute a system of periodical *x*-ray examinations of all men exposed to coal dust, so that in every case the earliest stages in the development of the disease may be observed. In this way accurate and up-to-date evidence will gradually be accumulated of the success or failure of dust suppression. If at the same time routine periodical dust-sampling surveys are made at the men's working-places, essential information of value concerning standards of permissible dustiness will gradually be accumulated. More important still, it will be possible to advise men at the appropriate stage of the disease that they must leave a dusty working environment.

Here, however, lies the kernel of the problem. What is the appropriate stage? The final answer to this question can only be given in the light of experience gained by a system of periodical examinations in action. Since, however, it is a matter of urgency that such a system should be initiated, some provisional answer must now be given. The simplest answer would be to say that any man showing evidence of even the earliest stages of pneumoconiosis should be advised to leave the industry, but this should not be necessary if continuous medical supervision of all such cases can be assured. Moreover, large numbers of working colliers, at least in South Wales, show some early signs of pneumoconiosis in their *x*-ray films. To recommend all these men to leave the industry would be to cast them upon an unreceptive labour market without any training or skill outside their own profession. Further, it would mean closing a large number of the coal-mines in South Wales at a time when increased coal production is the nation's most urgent need.

Can we then provide any evidence of what may be regarded as a dangerous stage of pneumoconiosis at which a man must be advised to leave a dusty working environment? The dangers which we must consider are the development of focal emphysema and of progressive massive fibrosis, for these are the chief causes of disability and death in this disease. Unfortunately we have no evidence concerning the risk of development of focal emphysema at any particular stage of the illness, for this condition is not at present diagnosable in life. It should, however, be possible to discover at what stage of radiological abnormality a man becomes a potential candidate for the development of progressive massive fibrosis. I have attempted to get evidence on this point by reviewing all the Hart and Aslett cases which we have followed up, and of which we had a film showing progressive massive fibrosis at its earliest stage of development. There were only 28 of these cases. In all but three of them the degree of reticulation was sufficient to qualify for certification under present standards. In these three cases the intensity of the reticulation was only slightly below this standard.

The evidence at present is meagre, but, so far as it goes, it suggests that men might be ensured safety from progressive massive fibrosis if they were advised to leave a dusty working environment at a stage slightly earlier than that which at present qualifies for certification. We are now engaged upon seeking further evidence on this point.

Another factor that must be considered is the man's age. A man who does not develop a dangerous stage of reticulation until, say, the age of 55, and in whom serial *x*-ray films give little evidence of progression, will stand so small a chance of developing a serious degree of progressive massive fibrosis within his natural span of years that it would hardly be necessary to recommend him to leave his employment.

Next, there is the question of what a man who has already reached the dangerous stage, as I have defined it, should be advised. We have seen that there is some evidence that the development of progressive massive fibrosis may not be dependent on further exposure to dust. It is therefore questionable whether such a man would benefit by being advised to leave underground work. But we cannot deny that further accretions to the dust in the lungs may increase the liability to develop focal emphysema.

Finally, what of the man who has already developed some degree of progressive massive fibrosis? We have as yet no clear evidence on which to base an answer to this question, although we hope to obtain some evidence when we have completed our analysis of the progression shown by cases *x*-rayed by Hart and Aslett. The possibility that these men may develop open tuberculosis must be considered. It may be that they should be suspended in any case in the interests of their fellow workmen.

Under a system of periodical examination, then, the men to whom a change of environment should be firmly recommended are the younger men in whom serial examinations show that reticulation is approaching but has not yet reached the present certifiable level. It should be unnecessary to suspend them altogether from coal-mining, but only to offer them working places which, from continuous dust estimations and the results of periodical examinations of the men working there, are known to be safe from a risk of pneumoconiosis. The older and non-progressive cases and those who have already reached a "dangerous degree" of pneumoconiosis could, if they wished, remain at their work so long as they were free from symptoms which would necessitate their undertaking a less strenuous occupation.

The urgent necessity for the institution of an appropriate system of periodical *x*-ray examinations, which alone can give our coal-miners security from pneumoconiosis, cannot be over-emphasized. Such a system was recommended by the Industrial Pulmonary Diseases Committee of the Medical Research Council in 1942. It was again recommended by the Advisory Committee on Treatment and

Rehabilitation in 1944 (Ministry of Fuel and Power, 1944). Such a system has for many years safeguarded the gold-miners at Johannesburg and Ontario and elsewhere; it is already in operation in certain silica-risk industries in this country; and it has recently been set going throughout the coal-mines in France, in which the problem of pneumoconiosis is almost as severe as it is in South Wales. The sincerity of the industry's and the Government's concern with the health of coal-miners will be judged by the speed and thoroughness with which such a system is instituted in this country.

Therapy

With regard to therapeutic as opposed to prophylactic measures, we cannot offer cure. There is no known method for reducing the fibrosis which is already present in the lungs, and at present the scarcity of sanatorium accommodation does not render practicable a proposal to treat the earlier stages of progressive massive fibrosis by prolonged bed-rest. Dr. M. C. S. Kennedy has recently joined the Unit to undertake trials of aluminium therapy, which will be started among cases of pure silicosis in the Potteries, but at present we must be content with palliative measures, which are often of value.

In the 183 cases seen as in-patients in Llandough Hospital it was found that we can help in two main ways. First, we can remove the fear of an early and distressing death under which so many of the men labour even in the earliest stages where the prognosis is good. The consequence of this fear is the grafting of a form of effort syndrome on top of the organic disability. It is too early yet to make a proper assessment of our results, but with simple, graduated general and breathing exercises we have been able to produce subjective improvement in the symptoms of many of our patients. One story may illustrate the psychological effect of such methods. It concerns a man who had been in the ward previously and had returned after six months for further investigation. He said he had been very much improved by his earlier stay in the hospital. I asked him, "Is your breathing any better?" "No," he said. "Then is your pain in the chest any better?" "No," he said. "Then have you gained any weight?" "No," he said. "Then in what way are you better?" "Spiritually, doctor," he said. No one but a Welsh miner would have given this answer. He illustrated what he meant by explaining that during the great frost of 1947, when the bus which took him one mile and a half to work stopped running for four weeks, he walked the whole way in the snow every day, a feat which he would not have attempted before his admission to our ward.

Secondly, we find, as many observers have found in classical silicosis, that in the dyspnoea of the later cases bronchial spasm plays an important part. Antispasmodics, especially in the form of aerosols for inhalation, may produce a dramatic improvement in exercise capacity in many cases.

Physiological Studies of Disability

I will refer briefly to one other among many lines of investigation which we are pursuing.

Dr. J. C. Gilson and Dr. P. Hugh-Jones are studying the disturbances of respiratory function in cases of pneumoconiosis by physiological methods. Apart from its intrinsic interest, this study has two important practical aspects derived from the fact that the degree of radiological abnormality in any case does not give an accurate indication of the severity of the associated respiratory disability: first, there is the need to provide some objective method of disability assessment for purposes of compensation and job selection; secondly, there is need for a means of diagnosis in certain cases in whose *x*-ray films we believe that focal emphysema may have obscured the underlying coal nodulation. Two contrasting cases may illustrate the problem.

The first of these men, a steam-coal collier aged 55, is so dyspnoeic that he can only walk very slowly on the level. Although his radiograph shows some reticulation, there is not sufficient abnormality to qualify for certification, and he has been three times rejected by the Silicosis Board. In contrast to this case is the second case, that of a steam-coal collier aged 39. He works as a railway porter and finds no difficulty in carting sacks of potatoes about, but his radiograph shows massive shadows in both lung fields. This man holds our local record for the quarter-mile dash with a time of 79 seconds.

Acting on the hypothesis that emphysema, either focal or bullous, is an important factor in the causation of disability in cases of coal-miners' pneumoconiosis, Gilson and Hugh-Jones have first studied disturbances of the different divisions of the lung volume, with particular reference to the proportion of the total lung volume occupied by the residual air. This test for emphysema has hitherto proved unsatisfactory, largely because of the wide range of variation found among normal subjects, which means that it is not possible to be confident of the degree of abnormality revealed by a single estimation in any one case; but it may be of greater value in studying cases of pneumoconiosis when periodical examinations are carried out, for it will then be possible to use earlier observations on any individual case as a base-line, deviations from which may be significant even within the accepted range of normality. A report on this work will shortly be published (Gilson and Hugh-Jones, 1948). Studies of minute-volume during exercise in relation to the maximum breathing capacity are now being made. Disturbances of alveolar gas exchange are also being investigated, but preliminary results suggest that impairment of the ventilatory function of the lungs in cases of pneumoconiosis is more important than impairment of alveolar gas exchange.

Future Action

I have said that the inquiries of the Pneumoconiosis Research Unit have been largely directed towards practical ends. We have sought to gain information upon which sound preventive and therapeutic measures may be based. It is natural, therefore, that we should look with interest for developments in the field of administrative action.

Following upon a conference held by Mr. Shinwell in Cardiff in January, 1947, a National Joint Pneumoconiosis Committee was set up in the following July, under the Chairmanship of the Parliamentary Secretary to the Ministry of Fuel and Power. On this committee the various Departments concerned with the problem of pneumoconiosis of coal-miners are represented at a high level. It has four subcommittees reporting to it on dust prevention, medical examination, treatment, and industrial rehabilitation. Members of the Pneumoconiosis Research Unit serve on these subcommittees, and a direct channel is thus provided between research and administrative planning.

The aim of this National Committee is "to prepare a co-ordinated plan for future action and to make recommendations accordingly." This is an excellent aim, but recommendations have been made in the past and they have not always been followed by action. We know that pneumoconiosis is a preventable disease and that much can be done to help those already disabled by it. The call to action is imperative.

Summary

The history of coal-miners' pneumoconiosis is briefly considered, and the investigations into the disease carried out under the Industrial Pulmonary Diseases Committee of the Medical Research Council are summarized.

The introduction of the term "reticulation" to describe the earlier radiological changes of coal-miners' pneumoconiosis is criticized.

A short account is given of dust-suppression methods. The importance of the biological approach to the design of dust-suppression methods is stressed.

The rapid increase in certification rates in recent years is described. It is suggested that in most areas it is due chiefly to the effect of the Coal-miners' Pneumoconiosis Order and to increased awareness of the disease, coupled with opportunities of alternative employment outside coal-mining, rather than to a true recent increase in disease incidence. In the steam-coal pits of East Glamorgan, however, there has been a true increase in incidence recently. There may also have been a true increase in incidence in certain other coalfields in Great Britain, but the incidence there is not likely to become as serious as in South Wales.

It is suggested that the variation in incidence of disease from pit to pit in South Wales is due chiefly to differences in the concentrations of air-borne dust underground rather than to qualitative differences in the dusts.

The post-mining employment of certified cases of pneumoconiosis is considered in the light of investigations carried out by the Pneumoconiosis Research Unit. Reasons are given for suggesting that special employment provisions are needed in addition to those already planned.

The radiological progression of certified cases who have left underground work is compared with that seen in cases continuing to work underground. Progression takes the form chiefly of the appearance of localized shadows which develop into large massive shadows. The name "progressive massive fibrosis" is applied to this condition. Its development appears to be independent of continued dust exposure.

Consideration of clinical, pathological, histological, and radiological evidence suggests that infection, perhaps tuberculous, superimposed upon a lung already occupied by dust is responsible for the development of progressive massive fibrosis.

Prevention of the disease may in the future be achieved by dust suppression. It can at present be assured only by the institution of periodical medical and *x*-ray examinations of all underground workers in coal-mining.

Therapy at present is only symptomatic, but much can be done by reassurance and exercise in early cases and by the use of antispasmodics in certain more advanced cases.

The physiological mechanism of breathlessness in coal-miners' pneumoconiosis is being investigated.

The prevalence of pneumoconiosis among coal-miners in Great Britain, and particularly in South Wales, calls for speedy and effective action directed to prevention and after-care.

Every member of the Pneumoconiosis Research Unit has contributed in some measure to the preparation of this paper: to them and to Dr. J. Gough, of the Welsh National School of Medicine, I wish to express my thanks for their help. I am also grateful for facts and figures supplied by the medical staff of the Silicosis Medical Boards and by officers of the Ministry of Fuel and Power and of the Ministry of Labour and National Service. The social and clinical studies that I have described have been made possible by the enthusiastic assistance given to me and my colleagues by the South Wales Miners' Federation.

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"Each Regional Hospital Board should have a permanent committee consisting of members of the Board and co-opted persons, whose function would be to co-ordinate the control of tuberculosis together with that of major respiratory conditions, with the ultimate object of creating a complete service for tuberculosis and chest diseases." This is one of the recommendations that the National Association for the Prevention of Tuberculosis has recently made for the consideration of Regional Hospital Boards. The N.A.P.T. draws particular attention to certain aspects of tuberculosis that it considers neglected at present: It lists (*a*) the treatment of those patients with tuberculosis of more than one organ simultaneously; (*b*) genito-urinary infection; (c) tuberculosis in children apart from those gross cases treated in orthopaedic departments; and (*d*) tuberculosis in pregnant women.

INTESTINAL LESIONS IN MALIGNANT HYPERTENSION

WITH REPORT OF A CASE

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[WITH PHOTOGRAVURE PLATE]

Although pathological studies of the widespread arteriolar lesions in hypertension have been made, and their frequency in the spleen, kidney, adrenals, pancreas, and gastro-intestinal tract noted, the clinical implications have not been so fully considered (Fishberg, 1934; Moritz and Oldt, 1937; Morlock, 1939; Foa, Foa, and Peet, 1943; Klemperer and Otani, 1931). Fishberg found in his series that only 9% of those with hypertension showed involvement of the gastro-intestinal vessels, while Moritz and Oldt found 15% in a similar group of cases. A study of the literature has failed to reveal any report of the clinical picture produced by such lesions, although it is apparently known that ulceration, haemorrhage, and even perforation with peritonitis may occur. In the present case the intestinal lesions were of great severity and had caused partial infarction of the ileal wall leading to ulceration, haemorrhage, and peritonitis. Clinical symptoms were noted, but they were overshadowed by those of the more serious hypertensive attacks and by the action of the sedatives which the attacks necessitated.

Case Report

A married woman aged 44 was admitted to hospital on July 29, 1946, complaining of severe morning headaches and vomiting. There was a two-weeks history of mistiness of vision, morning headaches associated with persistent retching and vomiting, and dyspnoea on exertion. She had lost 28 lb. (12.7 kg.) in weight over an unspecified period of time. She had had five children, all of whom were alive and well. During two of her pregnancies she had suffered from toxaemia (1931 and 1938), but neither had to be terminated. Recovery in each case was apparently uneventful.

On examination she was found to be pale, thin, and slightly pigmented. Gross bilateral papilloedema was present, and the heart showed clinical enlargement. Blood pressure was 270/170 and haemoglobin 82% (Haldane).

The vomiting remained very persistent, and haematuria, menorrhagia, and rectal bleeding soon followed. By Aug. 11 the haemoglobin had fallen to 42%, the blood urea was 100 mg. per 100 ml., and the urea clearance gave an average figure of 16%. Cystoscopy revealed bleeding from each ureteric orifice, and rectal examination was tender on pressure in the pouch of Douglas. The patient complained of epigastric pain, which was not accompanied by rigidity, and soon afterwards had a sudden attack of cough and tightness in the chest, which was relieved by morphine. On Aug. 12 there was still some abdominal pain and distension, and hiccup proved troublesome.

For the next eleven days the clinical picture was one of persistent vomiting, gradually increasing abdominal distension, obstinate constipation, and a slowly falling pulse, although there was no associated rise of temperature. On Aug. 23 she had a typical hypertensive fit, which lasted for five minutes and ended in coma; a gradual recovery of consciousness followed. The neck veins were distended, the liver extended to three finger-breadths below the costal margin, and the blood pressure had fallen to 210/130. Further attacks occurred, and the patient died in coma on Aug. 25.

Post-mortem Examination

The body was pale, thin, and wasted, with marked abdominal distension, and weighed 6 st. 11 lb. (43 kg.). Internal appearances were as follows. Brain: Congested and oedematous; marked atheroma of the basal vessels. Spinal column: pronounced scoliosis; cord not examined. Heart: Weight, 400 g.; left ventricular hypertrophy and dilatation; both auricles dilated; tricuspid ring admitted tips of four fingers, the mitral orifice three fingers; heart muscle of fair quality. Coronary arteries: Slight generalized thickening of wall, but lumen not obviously diminished. Aorta: Moderate degree of atheroma, especially in the abdominal portion. Lungs: Air passages contained much fine froth, while the lungs showed acute oedema and congestion. Peritoneum: About 100 ml. of turbid yellow fluid was present in the general peritoneal cavity, and about 50 ml. of pus in the pelvis; several coils of ileum were loosely adherent and showed plaques of fibrin on the peritoneal aspect. Stomach, duodenum, and jejunum were normal. Mesenteric vessels: Careful examination showed no macroscopic abnormality.

Ileum: At about its middle a length of some 4 ft. (1.22 metres) showed areas of haemorrhagic mucosa in which superficial ulceration could be clearly seen; the ulceration had no particular distribution. Large intestine, normal. Liver: Weight 1,420 g.; cut surface pale, otherwise normal. Spleen: Weight, 90 g. Dark, firm, congested. Kidneys: Weight, left 96 g., right 100 g. Both showed similar appearances; the capsule stripped with some difficulty, leaving an irregular, finely granular surface; the cut surface showed the kidney pattern to be preserved, while the average thickness of the cortex was 6–7 mm.; the blood vessels in the marginal zone were unduly prominent. Bladder: Contained about 50 ml. of purulent urine. The interior appeared normal except for a superficial ulcer, 1 cm. in diameter, which was covered with whitish necrotic material.

Histological Report

In order to classify the retrogressive changes sections were stained by haematoxylin and eosin, Sheridan's elastic stain with Van Gieson, Mallory's phosphotungstic acid haematoxylin and the picromallory method (McFarlane, 1944). The results are given below.

Heart.—The muscle fibres show evidence of marked hypertrophy, and there are in addition several areas of degeneration and replacement fibrosis.

Cerebral cortex.—Brain tissue normal. Arterioles in overlying meninges show some medial hypertrophy.

Striated muscle (pectoralis major).—Small areas of replacement fibrosis only.

Lung.—Congestion of alveolar capillaries, with a small amount of eosinophil material and some "heart failure" cells in a number of the alveoli.

The most marked changes were seen in the kidney and ileum, where degeneration and necrosis were prominent. On the other hand, the medial hypertrophic changes seen in hypertension were present in all the sections taken. These changes have been classed as:—(1) Intimal fibrosis: Staining reaction is pale pink with Van Gieson's method and blue with picromallory. (2) Fibrinoid degeneration: Reddish-orange with picromallory, bluish-purple with Mallory's phosphotungstic acid haematoxylin. (3) Arteriolar necrosis: Here the disintegration of the wall can be seen with haematoxylin and eosin.

Ileum.—Sections show superficial ulceration of the mucosa with secondary infection (Plate, Fig. 1). The most striking change is in the arterioles of the submucosa, where (*a*) the lumen shows great diminution as a result of intimal fibrosis (Fig. 2); (*b*) well-marked fibrinoid degeneration is present; and (*c*) in some vessels there is disruption of the vessel wall with surrounding inflammatory-cell reaction (Figs. 3 and 4).

Kidney.—Considerable narrowing of the interlobular and afferent glomerular vessels is present. In each case there is marked intimal fibrosis, but in addition the afferent glomerular arterioles show fibrinoid degeneration. Some glomeruli show focal degeneration of the tuft (Fig. 5), the affected portion giving a similar staining reaction to that of fibrinoid degeneration in the arterioles. In addition many glomeruli show thickening of Bowman's capsule with an occasional adherent tuft.

Adrenals.—Marked intimal fibrosis of capsular arterioles with early fibrinoid degeneration.

Liver.—Some increase in the portal tract connective tissue, together with intimal fibrosis and early fibrinoid degeneration of the hepatic arterioles.

Bladder.—A small area of superficial ulceration is present. While the arterioles show definite diminution of the lumen as a result of

intimal fibrosis, the change is not comparable in severity to that seen in the ileum.

Uterus.—Arterioles of uterine wall show considerable narrowing as a result of intimal fibrosis.

Discussion

Although most attention has been devoted to the kidney in the study of hypertensive arteriolar lesions, the widespread nature of the change has been well recognized. Morlock (1939) studied the ratio of the size of lumen to thickness of arteriolar wall in a hypertensive and a control group and claimed to have found significant changes in a number of organs, including the gastro-intestinal tract. Foa, Foa, and Peet (1943) carried out similar measurements in muscle biopsies and compared them with those made in the arterioles of many organs from a series of post-mortem cases. They concluded that the abnormalities found in the muscle biopsies were representative of the general arteriolar changes in the rest of the body. An excellent and very complete study of hypertensive arteriolar lesions throughout the body was made by Moritz and Oldt (1937), who demonstrated that similar mild changes might be found in certain organs in non-hypertensive individuals, although severe changes were rare except in the spleen. When the changes in a hypertensive group were compared the organs most often affected were, respectively, the spleen, kidney, pancreas, adrenals, and gastro-intestinal tract. In these organs the lesions were in many cases classed as severe. It is therefore a very significant fact that two organs—namely, the kidney and the gastro-intestinal tract—should show frequent severe arteriolar lesions in hypertensive cases when no case in the control group showed any severe change in these organs. In contrast there were a number of cases with severe lesions of the splenic arterioles in the control group, and their appearance in hypertensive cases is thus of lesser significance (see Table). They furthermore noted

Table Showing Incidence of Severe Changes (figures from Moritz and Oldt, 1937)

Organs	Severe Changes	
	Non-hypertensive Group	Hypertensive Group
Spleen	21%	55%
Kidney	0%	47%
Gastro-intestinal tract ..	0%	15%
Pancreas	5%	43%
Adrenals	6%	42%

that 38% of those with chronic hypertension showed superimposed acute degenerative, necrosing, and inflammatory lesions in the renal arterioles. This type of lesion was not, however, confined to the kidney, and it is interesting to note that it was found next most frequently in the gastro-intestinal tract. It is now well realized that a small number of patients with chronic hypertension, whatever the aetiology, may develop a terminal malignant hypertension, and the acute lesions described represent this condition. The fact that severe lesions are found more often in benign hypertension in the spleen, kidney, pancreas, and adrenals than in the gastro-intestinal tract is in marked contrast to the incidence in malignant hypertension. Here the gastro-intestinal arterioles are affected next in frequency to the kidney, and it clearly suggests that when severe gastro-intestinal lesions occur they are confined to cases of malignant hypertension. It should not, however, be forgotten that the retinal vessels are not normally examined at necropsy, and probably have the highest incidence of all.

These observations have been amply confirmed in experimental work where the pathological picture was one of malignant hypertension. Wilson and Pickering (1938), producing hypertension in rabbits, noticed especially well-marked acute arterial lesions in the intestine. Wilson and Byrom (1939) found in their hypertensive rats that, apart from the kidney, the most severe acute lesions were present in the mesenteric arteries, and that these lesions were so acute as to resemble those seen in human polyarteritis nodosa. This is of some interest when it is remembered that the kidney and gastro-intestinal vessels are so often affected in that disease. Pickering and Prinzmetal (1938) found acute arterial and arteriolar lesions in the gut in hypertensive rabbits and described petechial haemorrhages in that organ. This is reminiscent of Goldblatt's (1938) classical hypertensive experiments on dogs, in which he found similar petechial haemorrhages in the gastro-intestinal tract and which he attributed to rupture of a dissecting haemorrhage into the walls of severely degenerated, hyalinized, or necrotic arterioles. This lesion of the arterioles he considered to be identical with that seen in malignant hypertension in man.

There are few references in the literature to gastro-intestinal arteriolar lesions giving rise to pathological changes such as ulceration and haemorrhage in man. This may be due to the fact that the disease has proved fatal before the gastro-intestinal changes have become sufficiently advanced. Klemperer and Otani (1931) described four cases of "haemorrhagic enterocolitis" in malignant hypertension, but gave very few details beyond noting that in one of these cases the lesion was confined to the jejunum and ileum. Jablons (1944) in a clinical study of gastro-intestinal symptoms in hypertension and renal disease found that most cases showed no "demonstrable macroscopic lesions" in the gastro-intestinal mucosa. He mentions, however, that ulcerative lesions occur in malignant hypertension and are often responsible for extensive bleeding. In a series of ten cases he found ulcerative lesions of the large intestine in two. Jablons states that this ulceration may occur anywhere in the alimentary tract from the pharynx to the anus and may cause haematemesis or rectal bleeding at the outset of the disease, although it is commoner as a terminal feature. Professor Clifford Wilson (personal communication) states that he has observed vascular lesions in the bowel in many cases of malignant hypertension, sometimes leading to ulceration and in two cases to perforation and peritonitis. These observations are well in accord with the features of the present case, in which rectal bleeding developed just over two weeks before death, and in which ulceration of the small intestine with peritonitis was found at necropsy although no perforation had occurred. A clinical diagnosis was not made, probably because there was considerable sedative administration to combat the rather severe terminal hypertensive attacks.

It is therefore suggested that gastro-intestinal ulceration, haemorrhage, and perforation occur only in malignant hypertension. In this disease the arteriolar lesions are of necessity much more severe, and the gastro-intestinal vessels are involved in a greater number of cases. The recognition of such a possibility is considered to be of clinical importance, although it is realized that in a number of cases gastro-intestinal complications will occur only as a terminal event.

Summary

A case of malignant hypertension with intestinal ulceration, haemorrhage, and peritonitis is described.

The pathological lesions of the alimentary tract are accounted for by the increased vulnerability of the gut in malignant hypertension.

The possible clinical importance of recognizing such a condition is raised.

I should like to express my thanks to Dr. Geoffrey Bourne for permission to publish the case, to Prof. Geoffrey Hadfield for much valuable help and criticism, to Dr. G. S. Sansom for the photomicrographs, and to Mr. J. W. Miller for technical assistance

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SILICEOUS GRANULOMA DUE TO TALC

A CAUSE OF POST-OPERATIVE PERITONEAL ADHESIONS

BY

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AND

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[WITH PHOTOGRAVURE PLATE]

Post-operative peritoneal adhesions have long excited the interest of surgeons and stimulated speculation about their pathogenesis. One is often surprised at operation by the scantiness, softness, and avascularity of intraperitoneal adhesions seen after the resolution in an unopened abdomen of a bacterial inflammation such as an appendicular abscess or a more generalized peritonitis. On the other hand, if it be necessary to reopen the abdomen after an aseptic laparotomy, adhesions may be found that are dense, vascular, and widespread. These findings suggest that laparotomy may on occasion introduce into the abdomen a substance more persistently irritant than bacteria. Observations over the past 15 years have identified one such irritant as talc—a complex magnesium silicate—the substance used almost universally in the preparation of gloves for operation. Two excellent reviews on the harmful effects of talc in the peritoneal cavity have appeared in the past year in America (Eiseman, Seelig, and Womack, 1947) and in this country (Roberts, 1947).

Within the abdomen the irritant action of talc elicits a proliferative response comparable to that found in traumatic siliceous granuloma (pseudotuberculoma silicoticum) (Shattock, 1916; Faulds, 1935). The effects are not limited to the peritoneum, and the implantation of talc at laparotomy may be followed by granulomatous formation in the scar, by sinuses or faecal fistulae, stenosis of entero-anastomotic stomata, and, as Roberts has shown, by chronic fibrosis of the Fallopian tube with consequent sterility. The patient's history and the density of the peritoneal adhesions found at operation may suggest the diagnosis of siliceous granuloma, but the only certain proof is to find, in microscopical sections of the collagenous tissue, doubly refractile material with the appearance of talc closely related to foreign-body giant cells. The use of " polaroid " screens on the ordinary microscope is simple and usually leaves little doubt about the diagnosis, but, unless sections are examined for anisotropic material, cases may easily escape recognition and be diagnosed as tuberculosis, regional enteritis, sarcoidosis, keloid scar, or non-specific foreign-body reaction, although the situation of the granuloma may well occasion comment.

Foreign bodies such as suture material are often surrounded by giant cells and can show in varying degrees the property of rotating the plane of polarized light, but they are unlikely to be scattered diffusely in the peritoneum, and the structure of talc as seen by polarized light is fairly characteristic (see Plate, Fig. 3). Many years after its implantation in the tissues talc has been recognized in sections prepared by routine histological methods (Roberts, 1947).

Case History

Miss B., aged 74, was admitted to the medical wards of the Western Infirmary on Oct. 3, 1947, for investigation of a severe anaemia which had developed over the past four years. She was found to be passing considerable quantities of altered blood in the stools, but intensive clinical, haematological, and radiological investigation failed to establish a source. Transfusion of 9 pints (5.1 litres) of blood over a period of a month scarcely replaced the loss, and her condition remained precarious. The decision to perform laparotomy was taken in the hope of finding the bleeding-point. She had undergone no previous abdominal operation.

First Operation.—On Nov. 26 Prof. C. F. W. Illingworth made a right paramedian incision in the upper abdomen, and his note states that wide exploration of the abdomen was carried out. A Meckel's diverticulum was found attached by its fundus immediately deep to the umbilicus. The diverticulum was not apparently the source of bleeding and so was not removed, though its tip was freed from the abdominal wall. The spleen was enlarged to perhaps twice normal size. The previous haematological investigations having yielded no facts to contraindicate splenectomy, this was carried out and the arteries at the ends of both curvatures of the stomach were divided in the hope that the undisclosed lesion might be in the upper division of the portal system. The patient recovered uneventfully from this operation, but bleeding into the alimentary tract continued. On several occasions aspiration of the stomach was carried out over long periods, but no blood was recovered. By Dec. 9 the haemoglobin level had fallen to 38% and it appeared necessary to explore the abdomen once more. In the absence of Prof. Illingworth the responsibility for this step fell on one of us (W. A. M.). The patient was prepared by transfusion of 4 pints (2.27 litres) of blood.

Second Operation.—This was performed on Dec. 9, 13 days after the first operation. There were dense adhesions of recent origin involving the stomach, omentum, the Meckel's diverticulum, and the anterior abdominal wall. The diverticulum was removed and opened but no ulceration was found. The entire small bowel contained altered blood; nowhere throughout its length could a polyp or ulcer be palpated, but accurate examination of the stomach was prevented by adhesions. The abdomen was then closed; recovery from the operation was satisfactory, and four days later the haemoglobin value was 82%. Bleeding into the alimentary tract, however, continued as before, and to date is unexplained.

Pathological Report.—The specimen consists of a Meckel's diverticulum 3.5 cm. long. The peritoneum is dull and the wall thick and dense. The mucosa has a normal velvety appearance. Histological sections show zones of thickly woven collagenous connective tissue external to the muscularis and extending into it here and there for a short distance. This tissue replaces most of the subserous fat, is responsible for the increased thickness of the wall, and forms the outer surface of the diverticulum at several places (Plate, Fig. 1). Imbedded in it lie many foci of macrophages and foreign-body giant cells, arranged in some instances in the form of poorly defined follicles. These cells surround brownish crystalline doubly refractile particles of an average length of 15 μ and of a shape identical with surgical talc (Figs. 2 and 3). Similar material is seen underneath the serosa in varying concentrations in all parts of the diverticulum. The mucosa is of normal small-intestine type and no areas of gastric heterotopia are present.

Comment

There is no doubt that these lesions had their origin in the first operation, 13 days before the specimen was removed. It is comparatively rarely that the opportunity occurs to examine tissue removed from the abdomen such

a short time after laparotomy in an aseptic case, and we make this report to emphasize the speed with which dense fibrous tissues may form in response to a small quantity of talc. In the series of cases described by Eisman, Seelig, and Womack several patients complained only a few days after operation of symptoms later ascribed to talc granuloma, but histological examinations were not made in any of these until at least two months after the first operation. In our patient the reaction produced no symptoms despite its extent and intensity.

It is evident that the use of talc at operation constitutes a hazard potentially grave in its consequences for the patient. The authors of the two reviews quoted above recommend bluntly that it be abandoned. The suggested substitutes, potassium bitartrate and formolized starch, appear to be free of the irritant effect of talc, but unfortunately possess faults of their own, and the search for a completely satisfactory lubricant for gloves has not yet been successful. Until it is found we must obviously use talc with caution, make every effort to reduce the quantity to a minimum, and above all avoid depositing it in the peritoneal cavity.

Summary

The production of post-operative peritoneal adhesions by surgical talc is briefly discussed.

A case history is given of a patient whose abdomen was reopened 13 days after laparotomy. At the second operation extensive dense adhesions were found. Histological evidence is presented that these arose as a result of deposition of small amounts of talc at the time of the first operation.

We should like to thank Dr. W. R. Snodgrass and Prof. C. F. W. Illingworth for access to their records and permission to publish this case.

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"TUBERCULOSIS" (COEXISTENT WITH CARCINOMA OF THE UTERUS) SHOWN TO BE SILICEOUS GRANULOMA

BY

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[WITH PHOTOGRAVURE PLATE]

The present case was previously reported as an example of the rare coexistence of carcinoma and tuberculosis in the same organ (Smith, 1945). The diagnosis of tuberculosis was made on histological grounds without much dubiety, despite failure to demonstrate acid-fast organisms in the sections. Roberts (1947), however, has proved that granulomata occurring in the Fallopian tube, with a histological picture very closely resembling tuberculosis, may in fact be siliceous and not tuberculous: these foreign-body granulomata apparently follow the introduction of talc (surgical gloves) into the peritoneum, and in all his five cases of siliceous granuloma of the tube a previous appendicectomy had been performed and could well have been the occasion of implantation.

Restudy of my case in the light of Roberts's work suggests that the original diagnosis of tuberculosis is inaccurate and that of siliceous granuloma rather more likely, the more so as the patient also had undergone a previous appendicectomy.

Case History

Mrs. A., aged 44, had a "chronically inflamed appendix" removed in November, 1943; at operation the uterus was noted to be enlarged, but no signs of tuberculosis were observed. In December, 1943, there was a sudden discharge of thick yellow pus from the vagina. The gynaecologist's report was: "Mass palpable through the anterior fornix." In April, 1944, she was readmitted with vaginal bleeding and abdominal pain; at laparotomy the uterus was seen to be enlarged and white nodules were visible in the walls of both tubes at the uterine ends. The uterus and right tube were removed and sent to the laboratory. No sign of pulmonary or renal tuberculosis was detected at the time of hysterectomy; she has been well since then (46 months), and at present shows no signs of tuberculosis or malignant disease. The patient's husband, however, has recently been found to have pulmonary tuberculosis.

Pathology.—The upper part of the uterine cavity is completely occupied by a bulky friable mass of tumour tissue covering most of the posterior wall. Two small, pale, button-like nodules are present on the posterior wall, nearer the cervix. The right Fallopian tube shows a firm white nodule 1 cm. in diameter at the uterine end. Microscopically, the appearances in the uterine mass are those of an anaplastic adenocarcinoma. At the margins of the main growth, and in the two smaller nodules of tumour below, there are follicular structures, histologically tuberculous, with giant cells, areas of necrosis, and surrounding lymphocytes. The sections of the Fallopian tube show that the nodule there is not neoplasm but a further tuberculous-looking granuloma with rather more connective-tissue proliferation.

Examination of sections by polarized light revealed the presence of doubly refractive particles both in the tissues and in a few of the giant cells (Plate, Fig. 2). It also revealed a superficial collection of talc crystals with accompanying round-cell reaction immediately below the serous coat of the tube (Fig. 1). This latter lesion, although not far from the main mass of the granuloma, is highly suggestive of direct implantation of talc on the serous surface of the tube as against transport into the lumen, suggested by Roberts to explain the striking localization of the talc in his cases. It is important to note that of 70 sections of the tube only 14 showed the presence of anisotropic material. This material, as Roberts also points out, when contained within the giant cells is not always acicular in shape. Fifty-six sections of the uterine lesions have also been examined through "polaroid" screens, but no acceptable anisotropic particles have been seen.

Discussion

It is suggested that talc from the surgeon's gloves was introduced into the peritoneal cavity during the appendicectomy in November, 1943, and that this is the origin of the siliceous granuloma formed in the Fallopian tube. Although the granulomatous foci in the uterus failed to show anisotropic bodies it seems reasonable to regard them also as siliceous in nature.

The minimum period recorded by Roberts as elapsing between laparotomy and the discovery of a tubal lesion is two years; in the present case the interval was only five months. The discovery of the granuloma was, of course, incidental to the treatment of the cancer, and it is possible that the siliceous lesions would not otherwise have declared themselves for some time, if at all. The more actively necrotic character of the histological changes in my case compared with those described by Roberts may well be due to the earlier stage in development of the granuloma.

The period elapsing between the implantation of silica and the subsequent appearance of a superficial dermal granuloma has generally been lengthy—more so in the accident cases than in those with a lesion in a surgical scar. In most cases there appears to be a latent period, and in one traumatic case mentioned by Roberts the silica, driven mechanically under the skin as a result of a fall, lay there without provoking any noticeable reaction for 43 years. It

should be noted, however, that in this type of case the irritant is a different compound of silicon from that present in talc. Even then one was hesitant to accept the present case as being siliceous, in view of the short period of five months between the appendicectomy, when presumably the talc was introduced, and the subsequent discovery of a tubal granuloma. Walker (see below) has now shown that in seven weeks a siliceous granuloma can produce a firm peritoneal adhesion, and Mackey and Gibson (see p. 1077) describe a florid granulomatous lesion developing within two weeks of implantation of talc. Thus in the present case, with its five-months interval, one is justified, I believe, in accepting the anisotropic crystals in the giant-cell granuloma as proof of the siliceous origin. A further argument against the tuberculous nature of the granulomata lies in the fact that there were macroscopically similar nodules in the left tube, which was left *in situ*. If these had been tuberculous or, indeed, neoplastic in nature, it is reasonable to expect that clinical evidence to that effect would have presented itself by now.

Summary

A further case of siliceous granuloma of the Fallopian tube is reported. The patient had undergone appendicectomy five months prior to hysterectomy for carcinoma of uterus. Microscopy reveals the presence in the Fallopian tube of a pseudotuberculous granuloma with giant cells containing doubly refractive material, almost certainly surgical talc.

A granuloma similar in histological structure but without discoverable crystals is present in the uterus alongside the carcinoma.

I have pleasure in thanking Dr. Jean Herring for the clinical data, Messrs. Corkhill and Fraser for their technical assistance, and Prof. Lendrum for the photography and his help with this paper.

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SILICEOUS GRANULOMA DUE TO SURGICAL TALC AS A CAUSE OF PERITONEAL ADHESION

BY

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[WITH PHOTOGRAVURE PLATE]

The following case is reported to show that a single small post-operative peritoneal adhesion can follow the use of talc.

Case Report

A woman aged 58 had a strangulated left femoral hernia for which Lotheissen's operation was performed on Dec. 24, 1947. The sac contained strangulated small bowel and omentum. The former was delivered into the peritoneum, and after application of hot packs was considered to be viable. The omentum was excised and the hernial orifice closed. The patient did well until Feb. 6, 1948, when she developed symptoms first of acute obstruction and then of perforation. On admission to hospital on Feb. 10 she was *in extremis* and died within two hours despite restorative therapy.

The necropsy findings were general peritonitis and an obstruction of the small bowel due to adhesion and kinking 5 ft. (1.5 metres) from the ileocaecal valve. The mesenteric border of the ileum was doubled back on itself for some 6 in. (15 cm.) of its length, producing a U-shaped kink, the limbs of the U being firmly adherent to each other. The proximal limb of the U was grossly distended above the obstruction, and perforation had occurred through a gangrenous portion of its wall. There was no recurrence of the hernia. Histological investigation of the zone of adhesion reveals a fibrous fusion (see Plate, Fig. 1) in which there are giant cells containing anisotropic crystals. In the giant cell shown (Fig. 2) as photographed through partially crossed "Polaroid" screens, the mass of talc enclosed in the cell has been slightly displaced, as so often happens during the cutting of a section.

In view of the history, the impression at necropsy was that the adhesion had probably arisen in the portion of the bowel involved in the earlier hernia. However, the recent interest in talc as a cause of siliceous granuloma (Roberts, 1947) led to the microscopical examination of the adhesion. The fact that in the giant cells in this area there are doubly refractive acicular crystals makes it highly probable that talc introduced at the previous operation was in fact the origin of the adhesion. The lesion is slightly older than that described by Mackey and Gibson (see p. 1077), and differs in being a solitary focus.

Summary

Histological examination of a single peritoneal adhesion, observed seven weeks after a previous laparotomy, shows the reaction of siliceous granuloma with anisotropic crystals in the giant cells, probably surgical talc.

This small circumscribed lesion resulted in death.

I have pleasure in acknowledging the assistance of Prof. Lendrum and Mr. J. W. Corkhill with the photography, and of the former in the preparation of the paper.

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THE LIVER IN INFECTIVE HEPATITIS*

BY

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Major, R.A.M.C.

[WITH PHOTOGRAVURE PLATE]

This paper is based on the post-mortem findings on 17 cases of infective hepatitis—15 of them in Indians. The patients were admitted to four different military hospitals during 1943–7. The liver showed acute necrosis in eleven and subacute necrosis in five. The last case was under observation for hepatitis without jaundice during an epidemic of infective hepatitis in Malta.

Acute Necrosis

The onset of acute necrosis is sudden. It usually occurs within ten days after admission. In an average case of infective hepatitis the only warning, perhaps, is the presence of albumin in the urine. Mental irritability, vomiting, and stupor usher in cholaemia. Cheyne–Stokes breathing, coma, and pyrexia supervene, and the patient usually dies in three days. A marked diminution in liver dullness can be made out on percussion and the right lateral thoracic vein may be distended. There may be a significant fall in the serum proteins, especially albumin.

Case History

The patient from whom the specimen for the photomicrograph (Plate, Fig. 1) was taken was an Indian aged 22. He was admitted to hospital as an uncomplicated case of infective hepatitis in February, 1944. On the fourth day after admission he became semiconscious and irritable. The urine contained albumin, bile salts, bile pigments, and tyrosine crystals. Two days later he died. At the post-mortem examination the external appearance was that of deep jaundice. There were a

*A review of 450 cases of infective hepatitis by Damodaran and Hartfall appeared in the *British Medical Journal* dated Nov. 4, 1944 (p. 587). The reader is referred to that article for a better understanding of this paper.

few spots of petechial haemorrhage on the chest and abdomen. The peritoneum appeared normal; there was no effusion. The liver was about half the normal size and quite diffluent; its surface was smooth and the capsule wrinkled on handling. The cut surface was engorged and was oozing dark-red blood. Serial sections showed no focal lesions of any type macroscopically, the changes described being entirely diffuse. The gall-bladder was small and, together with the larger biliary passages of the liver, contained a little green very viscid bile and much mucus. There were no macroscopic changes in the hepatic biliary tracts, and the mucosa of the gall-bladder and bile ducts was of normal appearance. At no point was obstruction apparent.

Microscopy of the liver showed the general picture of an acute hepatic necrosis. Except in a few scattered areas the normal architecture of the lobules was absent. Recognizable liver cells showed extreme necrosis, but many had entirely disappeared. Round-cell infiltration was particularly marked in the subcapsular areas and along the portal spaces. The biliary ducts showed no evidence of proliferation. Bile-pigment granules were scattered throughout the microscopical fields—either in the necrosed liver cells or in the macrophages. In the kidneys no changes were observed macroscopically, but microscopy revealed changes limited to the tubules, the cells of which showed marked cloudy swelling. Nothing abnormal was noticed in the other organs.

Comment

In some of these cases a pint or two of bile-stained fluid could be seen in the peritoneal cavity, and petechial haemorrhages and generalized bile-staining of the abdominal viscera were also common. The gall-bladder was never distended, nor was there any obstruction found in the bile passages. The mucous membrane of the gall-bladder appeared to be normal. It is often impossible to squeeze out bile from the gall-bladder through the bile duct and ampulla of Vater, though no obstruction is detected on opening the bile passages. The contents of the gall-bladder—a mixture of viscid bile and mucus—are so very viscid that it is impossible to squeeze them through the bile duct. This explains Eppinger's finding of obstruction of the common bile duct in the oft-quoted necropsy on a case of jaundice in which death was due to an accident.

If death took place a few days after the onset of jaundice early fibrous-tissue formation could be made out at the periphery of the lobules and the interlobular areas. Fig. 2 is the photomicrograph of a section of liver taken from a case about a fortnight after the onset of jaundice. Note the fibroblasts in the interlobular space. The tiny dark particles scattered throughout the field are pigment granules.

One of the cases of acute necrosis was receiving arsenic injections for syphilis. This patient developed jaundice after the eighth injection of N.A.B. and died on the third day after admission. Section of the liver showed the same picture as in acute necrosis, already described, but the necrosis was more advanced and extensive. In some areas the cell outlines were visible, but they were without nuclei. The portal tracts showed some infiltration with mononuclears.

Subacute Hepatic Necrosis

Subacute hepatic necrosis is a more frequent but less fatal complication. After a period of 5 to 6 months in hospital the patient often recovers. In some cases, however, the jaundice may clear up, only to relapse again and again, especially after indulgence in alcohol. These patients have a chance of slow recovery if they lead a careful life, avoiding alcohol and other liver poisons.

Case History

An Indian soldier was admitted in March, 1946, with a history of five days' constipation, dark urine, and loss of appetite. The liver was enlarged to 2 in. (5 cm.) below the costal margin, and the spleen was palpable. The urine contained bile salts and pigments. Aldehyde and gel tests were negative. The jaundice did not clear up in spite of treatment in hospital, but slowly deepened. Ascites developed in June. The abdomen was tapped several times and large quantities of clear yellowish fluid were removed. Oedema of both legs developed later. He died on July 26. At necropsy the abdomen contained about 4 pints (2.27 litres) of clear deep yellow fluid. The spleen was firm and had increased in size, and the liver weighed 1,290 g., being markedly reduced in size; the capsule was only slightly wrinkled.

Microscopy of Liver (Figs. 4 and 5).—Section showed broad bands of fibrous tissue separating the liver lobules. The majority of the liver parenchyma cells had lost their nuclei. Some cells at the periphery of the lobules showed only normal nuclei or nuclear shadows. Many of the cells had undergone severe fatty degeneration, a number being almost completely replaced by fat globules. This change was most pronounced at the centre of the lobules. All the lobules revealed an increase of fine connective-tissue fibrils between the liver cells. The infiltration of mononuclears in the fibrous tissue is well shown in Fig. 5. There was slight proliferation of bile ducts. The fibrous tissue formed in these cases is so profuse that it is unlikely to be due to mere replacement fibrosis. It is more like a keloid growth.

Hepatitis without Jaundice

Between 1941 and 1943 I had under observation in Malta 18 cases of hepatitis without jaundice during an epidemic of infective hepatitis among the Forces. The characteristics of this group have already been described in the previous paper. The following case is mentioned because of the importance of the necropsy findings.

An N.C.O. aged 45 had a sudden onset of fever on May 16, 1942, with severe malaise, weakness, headache, and aching all over the body. His temperature rose to 105° F. (40.6° C.) on the first day, was swinging in character, and the pyrexia lasted for three days. The liver was enlarged to two fingerbreadths below the costal margin. The spleen was not palpable. On May 26 the liver was still palpable. Red cells, 4,700,000 per c.mm.; Hb, 90%; colour index, 0.95. White cells, 10,800 per c.mm. (polymorphs 44.1%, lymphocytes 48.1%, eosinophils 0.5%, basophils 0.5%, monocytes 7%).

This patient gave a history of chronic alcoholism. His age was rather too high for infective hepatitis; but the fever, enlarged liver, and marked lymphocytosis indicated a diagnosis of hepatitis without jaundice. A couple of months later he met with accidental death. At necropsy the liver was of normal size, but firmer in consistency. The surface was smooth. Microscopically, the general architecture of the lobules was maintained, but there were small collections of young vascular fibrous tissues between the lobules. The liver cells themselves showed slight fatty degeneration. The young vascular fibrous tissue must have been the result of his recent illness. The factor responsible for the hepatitis, whatever it might have been, had a destructive, degenerative effect on the liver cells and a stimulant, proliferative effect on the interlobular fibrous tissue. One is justified in assuming that he would have developed frank cirrhosis of the liver had he lived long enough.

Discussion

The study of individual cases alone gives no idea of the sequence of events, but the study of a series of cases for a long period enables one to picture what is happening in the liver. On the whole I have observed 500 cases of infective hepatitis, including 18 cases of hepatitis without jaundice, since 1941. The change in the parenchyma of the liver varies from cloudy swelling to frank necrosis of the cells with complete disappearance of the nuclei. Whatever the change is, it is not confined to a few lobules only, but is diffuse throughout. The stroma, on the other hand, is stimulated to proliferation. The proliferative process leading to fibrosis is most marked on the periphery of the

lobules. The process may run wild and form the pattern of portal cirrhosis. This sequence is illustrated in the photomicrographs. Fig. 1 shows the picture of extreme necrosis with cellular infiltration and partial disappearance of the nuclei. No proliferation of fibrous stroma is seen in the lobules and perilobular areas. Fig. 2 shows the early formation of fibrous tissue at the periphery of the lobules and to some extent in the lobules. Had this patient survived the acute stage the fibrous-tissue formation would probably have progressed to that shown in Figs. 4 and 5. In this connexion it may be mentioned that in the Tropics post-mortem autolysis of the liver often takes place, and the picture then is very likely to be confused with that of acute necrosis. The specimens illustrated in Figs. 1 and 2 were taken within four hours after death. The interval was not long enough for post-mortem autolysis. For comparison Fig. 3 shows the picture of post-mortem autolysis of the liver of an African soldier who died of syphilitic basal meningitis. The necropsy was done 14 hours after death. Note how the cells have disappeared, leaving the nuclei virtually unaffected, whereas the cells as well as their nuclei are affected in acute necrosis.

In the case of hepatitis without jaundice the liver cells appear almost normal, whereas there is marked proliferation of fibrous tissue at the periphery. When the condition is progressive the picture is exactly that of portal cirrhosis. It is noteworthy that only rarely do cases of portal cirrhosis give a previous history of jaundice; but such cases do occur, as is shown by the following examples.

An Indian aged 25 was treated for infective hepatitis 18 months ago. On discharge from hospital he was free from jaundice and had apparently recovered completely. Within a few months he lost his appetite and noticed a slight icteric tinge of the conjunctivae. He was readmitted a year after his previous admission to hospital. The liver was enlarged three fingerbreadths below the costal margin. There was no ascites. The spleen was just palpable, and a slight icteric tinge of the conjunctivae was noticed. The right lateral thoracic vein and lower abdominal veins were enlarged. The urine contained a trace of bile. A complete investigation revealed nothing abnormal except bile in the urine, a raised icteric index, and a moderate leucopenia. There was no evidence of gall-stones. Repeated examination of stools showed no amoebae or cysts. A course of emetine injections was tried without any effect on the liver or general condition. His temperature was normal and gel and Chopra tests were negative. The urine became bile-free after a course of glucose by mouth followed by daily injections of insulin (5 to 10 units only), but the size of the liver was not affected by treatment. This case was diagnosed in a civil hospital as portal cirrhosis.

I am indebted to Professor Dible for details of the following case.

An only child of healthy parents, aged 6½ years, was healthy till October, 1937, when there was an onset of abdominal pain, nausea, vomiting, epistaxis, sweating, fever, cough, and constipation. The fever settled and jaundice appeared three weeks from the onset. *February, 1938:* Admitted to Princess Louise Hospital, still jaundiced and losing weight; liver enlarged; van den Bergh reaction, positive direct. *August, 1938:* Discharged to country; still jaundiced and pyrexic. *September, 1938:* Bleeding from rectum. *October, 1938:* Pneumonia. *December, 1938:* Dysentery, with enlargement of liver and spleen; ascites and rales at right base. *December, 28, 1938:* Jaundice less; no bile in urine. *January 10, 1939:* Admitted to Hammersmith Hospital. A quiet, sensible, thin child, not distressed; face pale and puffy; colour sallow. T. 97–100° F. (36.1–37.8° C.); P. 80–130; R. 20. Superficial veins distended on anterior aspect on both sides of thorax. Diminished breath sounds; percussion and resonance at both bases, especially right. Abdomen distended; no evidence of free fluid; no tenderness. Liver 2 in. (5 cm.) below costal margin; firm, not hard, not tender; vaguely nodular. Spleen palpable; edge sharp. Urine: S.P. 1004–1022; contained trace of albumin, a few red cells, and occasional hyaline and granular casts. No bile. Blood count: R.B.C. 3,300,000 per c.mm.,; Hb, 60%; W.B.C., 6,000 per c.mm. (polymorphs 2,700, lymphocytes 3,200); platelets, 304,000 per c.mm. Serum bilirubin, 0.4 mg. per 100 ml. Serum phosphatase, 8 units per 100 ml. Van den Bergh reaction, direct negative. Bleeding time and fragility normal. Blood urea, 25 mg. per 100 ml. Blood culture, sterile. The general condition improved slowly, and on February 17 the patient was discharged: red cells then numbered 4,300,000, with 78% haemoglobin. *April 11:* Readmitted with a history of return of jaundice, with increasing abdominal distension, abdominal pain, and passing of blood per rectum; cough and dyspnoea. T., 101.6° F. (38.7° C.); P. 136; R. 30. Very ill, pale, and slightly jaundiced. Rales at bases of both lungs. Abdomen greatly distended. Free fluid present. *April 12:* Paracentesis abdominis: 1,500 ml. of clear yellow fluid withdrawn, sterile on culture; it contained a few blood cells, mostly lymphocytes. No acid-fast bacilli were seen. On April 13 the patient died.

Post-mortem Examination.—A pale slightly jaundiced child with protuberant abdomen. On opening the abdomen the peritoneal cavity was found to contain 1.5 litres of thin blood-stained fluid, with one or two recent clots adjacent to the needle-track. The parietal peritoneum was thickened throughout and studded diffusely with miliary tubercles. The mesentery contained an enlarged and caseous lymph gland. The lymph glands throughout the abdomen were enlarged and red. *Liver:* The right lobe showed an irregular scarred surface. The left lobe was smooth and considerably contracted. On the cut surface the right lobe showed a fine cirrhosis, suggestive of hyperplasia. The left lobe was almost entirely converted into fibrous tissue. The gall-bladder, bile ducts, and pancreas seemed healthy. Microscopy of the liver revealed an advanced cirrhosis mainly involving the portal areas, but in parts the liver cells were completely destroyed. The scar tissue was densely infiltrated by mononuclear cells. *Mesenteric gland:* This was almost entirely caseous, with a surrounding zone of small tubercles and lymphoid tissue. *Kidney:* The parenchyma showed several areas infiltrated by inflammatory cells (mononuclears), and the omentum had numerous tubercles.

The cause of death was cirrhosis of the liver and tuberculous peritonitis.

Here is a case that started as typical infective hepatitis, progressed to cirrhosis, and finally contracted terminal tuberculous infection.

Much publicity has been given to the so-called homologous serum jaundice. I must confess that I have never been able to recognize any difference between infective hepatitis and homologous serum jaundice. The published necropsy reports show an identical pathology. There has been much controversy over the incubation period. In homologous serum jaundice this has been variously estimated at from two to six months, with an average of about 100 days. In my view this is only apparent. The real incubation period is the interval between infection and the onset of malaise or anorexia. Jaundice may or may not appear, but it may be precipitated at any time within a period of six months from onset by "jaundice-precipitating factors." The experimental introduction of infective hepatitis on volunteers by Cameron (1943) in the Middle East confirms these views.

Through the courtesy of Dr. R. Rao, of the Haffkine Institute, Bombay, I have been shown a series of sections of liver of mice deprived of vitamins A and D. The sections reveal focal fatty degeneration with fibrosis. The fibrous-tissue reaction is quite marked, but the changes are not so diffuse as in infective hepatitis. It is not likely that the aetiology of infective hepatitis is similar. In man the vitamin deprivation is never as complete as in experimental animals. Prolonged and complete starvation, as in the case of certain hunger-strikers in India, never produced jaundice even just before death. In fatal cases of infective hepatitis the liver has been shown to contain vitamins in almost normal concentration. The decrease in vitamin content of

the blood in infective hepatitis appears to be secondary to the disease process.

The higher incidence of infective hepatitis among officers compared with men cannot be explained on the basis of avitaminosis. It is due to the greater incidence of "jaundice-precipitating factors" among them as already discussed in the previous paper.

Summary and Conclusions

The liver changes observed in fatal cases of infective hepatitis are described in detail. The sequence of these changes is traced from acute necrosis to portal cirrhosis. If death occurs within a fortnight the findings are those of acute necrosis. After a fortnight fibrous-tissue formation becomes apparent, especially at the portal tracts. The pattern is that of portal cirrhosis. In three months' time portal cirrhosis is obvious. In eighteen months the picture is that of portal cirrhosis, both macroscopically and microscopically. Jaundice waxes and wanes according to the intensity of inflammation of the liver cells.

This sequence occurs in less than 1% of cases. In the remaining cases the liver appears to recover ultimately.

Homologous serum jaundice is not a separate entity. The difference between apparent and real incubation periods is pointed out.

My thanks are due to Colonel Chandra, Colonel Lambert, Lieutenant-Colonel Daukes, and Lieutenant-Colonel Thomson for permitting this work to be carried out in the hospitals under their command; to Captain Ross and Captain Krishnaswami for valuable help in providing slides and records; and to Mr. Dodds for the photomicrographs.

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TORULA HISTOLYTICA INFECTION OF CENTRAL NERVOUS SYSTEM

BY

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[WITH PHOTOGRAVURE PLATE]

Tuberculous and torular meningitis give rise to very similar clinical pictures and to almost identical changes in the cerebrospinal fluid, so that the two diseases are not easily distinguishable. The clinical trials of streptomycin now being carried out make it important to differentiate between them. Levin (1937) summarized about 70 cases of torular meningitis, but the latest and most complete review of the disease is the monograph by Cox and Tolhurst (1946). Large numbers of cases have now been recorded, especially in America, Australia, and South Africa, but so far only three in Great Britain. Smith and Crawford (1930), in Harrogate, described the first case, which was diagnosed post mortem. Gelatinous swellings in the hypothalamic region and thickening of the basal and spinal meninges were found in which torula bodies were recognizable histologically. Greenfield, Martin, and Moore (1938), in London, recorded the second, which was also diagnosed post mortem. An adhesive meningitis around the basal cistern and pons was found, and torula bodies could be seen histologically in the meninges and in the perivascular spaces of the basal ganglia. Their presence was associated with granulomatous infiltration but no caseation. Blair (1943), also in London, described the third case, which was apparently diagnosed during life by the finding of torula bodies in the cerebrospinal fluid. No details of the chemical or cytological changes were included. At necropsy the subarachnoid space over each cerebral hemisphere, together with the lateral ventricles, was filled with yellowish gelatinous material. A case has recently come to our notice in Wales.

Case Report

A clergyman aged 60 was admitted to hospital on July 26, 1947, having had severe headaches for ten weeks, with lassitude and loss of appetite. The headaches at first occurred at intervals of one or more weeks, but later became more frequent and were associated with vomiting and sometimes with blurring of vision and tinnitus in the left ear. The only abnormal sign on admission was a doubtful left extensor plantar reflex. Lumbar puncture yielded clear cerebrospinal fluid under normal pressure, with 66 lymphocytes per c.mm. and 95 mg. of protein and 684 mg. of chlorides (estimated as NaCl) per 100 ml., the Lange colloidal gold and Wassermann reactions being negative. Other investigations, including radiography of skull and chest, were negative. The headaches gradually disappeared and the patient was discharged at his own request, free from symptoms, three weeks after admission.

He was readmitted on Sept. 2, the headaches having recurred three days after he left hospital and become continuous, with daily vomiting. There was now slight mental retardation. His tendon reflexes in the right arm were brisker than those in the left, but both plantar reflexes were now flexor. There were no other significant physical signs. On Sept. 4 the cerebrospinal fluid was under increased pressure (220 mm.), but there was now only one lymphocyte per c.mm. The proteins had, however, increased to 150 mg., whilst the chlorides had fallen to 620 mg. per 100 ml. After admission his condition improved, but by Sept. 11 the headaches were again severe and stiffness of the neck and slight Kernig's sign were present. His right knee-jerk was brisker than the left, but the arm reflexes were equal. The cerebrospinal fluid pressure was now 300 mm. and the cell count less than one per c.mm. The proteins were 180 mg. and the chlorides 670 mg. per 100 ml. Ventriculography on Sept. 18 showed no abnormality. During the next month there was periodic mental confusion with drowsiness, and on Oct. 7 a left external rectus paresis and a right-sided papilloedema were noted. The cerebrospinal fluid findings on Oct. 22 were as follows: pressure, 180 mm.; cells, 25 per c.mm. (95% lymphocytes, 5% polymorphs); protein, 250 mg.; chlorides, 626 mg., and sugar 16 mg. per 100 ml. The colloidal gold curve was 3442221000. From this time onwards the patient's condition deteriorated, wasting appeared, and by Nov. 6 the right pupil was larger than the left and well-marked left hemiparesis was present. He passed gradually into coma and died on Nov. 13, six months after the onset of his symptoms. The whole illness was almost completely afebrile until the last four days.

Necropsy Findings.—Along the basilar artery and in some of the sulci over the cerebral hemispheres a few flakes of fibrinopurulent exudate were found. The pineal gland was imbedded in a yellowish gelatinous substance which filled the pia-arachnoid space in that area. In the right side of the pons there was an area of softening about 1.5 cm. in diameter. The lateral ventricles contained slightly cloudy fluid, but were not dilated. There was an area of apparent softening beneath the ependyma of the right lateral ventricle, involving the adjacent portion of the caudate nucleus. Another area of softening involved the anterior portion of the left external capsule.

Hypostatic pneumonia was present in the lower lobes of both lungs, but there were no significant lesions in any other organ.

Histology.—Sections of the meninges showed granulomatous lesions, chiefly around the large blood vessels. The granulomata consisted of central caseation surrrounded by cellular zones in which there were small round cells, polymorphs, and pale endothelial cells, some of them large and multinucleated. The lesions closely resembled tubercles, but scattered throughout

them the highly characteristic *Torula histolytica* could be seen. These are round or oval yeast-like organisms surrounded by clear zones which represent their gelatinous capsules (Plate, Fig. 1). The bodies were in some parts clustered together, and were so numerous as to exclude other cells. Their staining properties were variable, some taking a pale blue with haemalum (as in Fig. 1), and with Gram stain a rather nondescript brownish colour. (We were unable to stain the capsules, and no budding was seen.) The lesions in the pons and left external capsule were areas of simple softening, but the subependymal lesion in the cerebrum was a torular granuloma. It differed from the meningeal lesions in that endothelial cells, especially the giant cells, were more prominent, while there was no caseation. Occasionally a torula body could be seen in a giant cell (Fig. 2). The vessels in the surrounding brain tissue showed perivascular lymphocytic cuffing.

Discussion

During life this case was thought to be either a cerebral tuberculoma or tuberculous meningitis. This diagnosis was supported by the decreased chloride and sugar content of the cerebrospinal fluid and by the normal ventriculogram, although repeated search for tubercle bacilli was unsuccessful. As the possibility of torulosis was not considered, the torula bodies were not specifically looked for, but they may well have been present and overlooked in the cytological examination, for they are easily mistaken for red blood cells or lymphocytes. If present in the cerebrospinal fluid they can be demonstrated by mixing the centrifuged deposit with a drop of indian ink. In a smear or wet preparation they then appear as small refractile bodies surrounded by broad colourless haloes.

There were certain features which, had they been appreciated at the time, might have helped in the diagnosis of this case. The illness lasted six months, during which the patient was for variable periods quite symptom-free. Also, except for the last four days when pneumonia was developing, he was almost entirely afebrile. These facts favoured torulosis rather than tuberculous meningitis.

Our thanks are due to Dr. Idris G. Jones for permission to publish the clinical details, and also to Mr. J. P. Napper for his technical assistance with the photomicrographs.

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Medical Memoranda

Large Mesenteric Cyst

Mesenteric cysts are held to be the least frequent of intra-abdominal tumours. Warfield (1932) collated 129 cases published since 1920, to which he added two of his own. He estimated that by then about 500 cases had been published since the accidental discovery of a mesenteric cyst during a dissection by the Florentine anatomist Benevieni in 1507. Since the appearance of Warfield's paper another 104 cases have been reported. Most of these are described in the South American and Scandinavian literature, however, while in the British literature only eight cases are recorded—viz., those of Steel (1933), Hastings (1934), Cross (1935), Jackman and Mayston (1936), Jewesbury (1937), Luker (1938), Riggall (1940), and Jones (1943).

CASE REPORT

A boy aged 2½ was brought up to the out-patients clinic for investigation. He had been subject to attacks of abdominal pains, especially after a heavy meal, often culminating in vomiting. These attacks would pass off gradually. The mother, from whom this history was obtained, had noticed that the child's abdomen frequently became distended during these attacks, and that a gurgling noise was audible towards their end, even though vomiting occurred. These attacks, obviously of intermittent intestinal obstruction, had been observed about every two to five weeks, starting when the child was eight months old, and were stated to have increased in severity.

X-ray examination, undertaken shortly after the beginning of these attacks, had been negative. They were repeated, and now showed considerable dilatation of the mid-coils of the small intestine, with definite delay in the passage of barium. An extrinsic pressure defect was noted on a coil of small intestine on the right side of the abdomen, suggesting compression by a soft tissue mass. Five hours after the barium meal had been given it was still seen to be held up in the small intestine, and none had reached the terminal ileum or caecum. "There is one very persistent coil," the radiologist reported, "closely looped upon itself, which suggests that this portion of the small intestine is actually partly rotated upon its axis and thus producing obstruction." Before this report had been delivered, however, the child had to be admitted for acute small-bowel obstruction.

Laparotomy was performed under general anaesthesia. A large cyst was found in the mesentery of a loop of the lower ileum. It extended for about 10 in. (25 cm.) along the mesenteric border of the ileum from a point approximately 4 in. (10 cm.) proximal to the ileo-caecal junction. The ileum was stretched over it almost to the point of obstruction. Apart from that the mesenteric base of the affected loop was very short and showed marked thickening and scarring, suggesting that volvulus had occurred previously, probably on several occasions. Indeed, twisting of this loop around its axis was noted at the time of operation. As the size of the cyst made it impossible to shell it out without interfering with the blood supply of the overlying gut, the whole loop was removed, a side-to-side anastomosis being made. Many enlarged glands were scattered throughout the mesentery. The child made an uneventful recovery, and was discharged home on the eighth day after operation.

Microscopical examination of the cyst showed the lining to consist of ciliated columnar epithelium with squamous patches. Muscular tissue was present in the wall, and the pathologist was of the opinion that the cyst was probably of teratomatous origin.

COMMENT

Warfield, and after him Luker, divided the cysts according to their origin into the following four groups: (1) Embryocystoma (from Wolffian remnants); (2) cystic dermoid or teratoma; (3) enterocystoma (foetal intestinal diverticulum); (4) chylus cyst.

The cyst described here was in a male child. This is of especial interest, since Warfield states that the cystic dermoids and teratomata always originate from displaced ovarian tissue. According to him no mesenteric cyst of that group has ever been recorded in a male patient, although teratomatous cysts have been met with in the spermatic cord. However, the testicle on its way downwards in the retroperitoneal tissues might occasionally leave some tissue behind, as it were.

I wish to thank Mr. H. H. Stewart, under whose care the child was admitted, and who performed the operation, for permission to publish this case. Also Dr. R. J. C. Campbell, who made the *x*-ray examination, and Dr. C. J. Young, who supplied the microscopical report.

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Recognizing that chest surgery requires a specially trained staff—medical and ancillary—with special equipment, the Society of Thoracic Surgeons has issued a "Memorandum on the Provision of a National Thoracic Service." It emphasizes that the organization must be regional and that the work must be concentrated in centres. Primary centres should be attached, if possible, to teaching hospitals, and there may be secondary and tertiary centres located conveniently in each Region. The surgery of both pulmonary tuberculosis and other chest diseases should be carried out in the same centre, but the patients should be segregated into separate wards or blocks. In London the special chest hospitals would naturally play a prominent part in the service.

Reviews

ENTOMOLOGY

Lehrbuch der Medizinischen Entomologie. By Prof. E. Martini. Third edition. (Pp. 633; 322 figures. Paper covers RM.27; stiff covers RM.29.) Jena: Verlag von Gustav Fischer. 1946.

Professor Martini's manual on medical entomology is one of the best known of the German publications on arthropods which cause and spread disease, and the present edition maintains the high standard of its predecessors. This volume contains more than 600 closely printed pages, and in so considerable a work the author might be expected to discuss in some detail most aspects of medical entomology as it relates to man. A closer examination of the text, however, shows that much of the book is on subjects which, although of great importance to the veterinary officer, protozoologist, and hygienist, are not directly the concern of the medical entomologist.

The first 120 pages are devoted to the general consideration, mainly systematic, of the *Arthropoda*, examples of which are usually, but by no means invariably, selected from creatures of medical importance. The nomenclature adopted in this section differs from that found in most modern textbooks on the subject, but the author has explained in the second and third editions his reasons for retaining this somewhat unusual classification. Pages 120–347 contain an excellent, but brief, account of "Arthropods as Parasites." The brevity referred to is due to the author's practice of including in the relatively small space available an account of insects mainly of veterinary importance. Thus, he gives as much attention to the medically unimportant genera *Gastrophilus* and *Hypoderma* as to the medically important genera *Cordylobia* and *Dermatobia*, while not only does he consider the ticks as parasites of animals as well as of man, but he includes an illustrated account of their control by dipping.

The next section of the book is entitled "Arthropods as Disease Carriers." Here again Professor Martini pursues his policy of describing the vectors of veterinary as well as of medical diseases. Furthermore, he describes the morphology and cycle of development of the parasites causing these diseases both as they appear in the arthropod vector and also during their sojourn in the vertebrate host. The result of this prodigality is that within the space of 180 pages he has packed in not only medical and veterinary entomology but a synopsis of helminthology and protozoology in so far as these subjects relate to arthropod-borne infections.

In the last section of the book he has gathered together some, but by no means all, of the more important methods for the direct control of the noxious arthropods. There is a comprehensive index and a bibliography containing almost 1,000 references. Professor Martini refers in the preface to the great difficulties under which he laboured in writing the third edition of his book, and it is significant of these difficulties, rather than a reflection on the author, that the literature quoted is nearly all from the pre-war period, and the reviewer has only noted forty-one references, of which thirty-nine are in German, to papers published after 1939. This volume is well printed and finely illustrated; indeed, the production is better than most post-war publications in Britain, while the price seems most reasonable. We can recommend it as a general guide to the part played by arthropods in causing disease among men and animals.

R. M. GORDON.

PROBLEMS OF FRACTURES

The Causation and Treatment of Delayed Union in Fractures of the Long Bone. By Kenneth W. Starr, M.B., B.S., M.S., F.R.C.S., F.A.C.S., F.R.A.C.S. (Pp. 233; 105 figures. 42s., postage 11d.) London: Butterworth and Co. 1947.

This book is Colonel Starr's Jacksonian Prize Essay, and he describes his studies on delayed union in the fractures of the long bones during the war. The book is divided into three main sections, the first being on the morphogenesis of bone. The author discusses the histology and biochemistry and subdivides bone into primary bone, or the coarse-fibred type, and secondary or lamellar bone. It is unfortunate that he does not mention here Professor Baker's recent work on callus formation. This section of the book contains good illustrations of many sections of callus made at differing time intervals from material which became available to the author during the course of his study. He also surveys the literature on the biochemistry of bone.

The second part of the book is on the healing of fractures. The author discusses the functions of the periosteum, the blood supply, and the structure of the bone itself. He emphasizes the necessity for an adequate local blood supply in the healing of fractures. He also considers the effect of injury on living bone, and the avoidance of bone loss or destruction of the fragments. The third part of the book is a study of the aetiology and treatment of delayed union, and the author discusses chemotherapy, the closed fracture, the open fracture, the infected fracture, and the problem of plastic surgery in relation to open fractures. He stresses the value of multiple drilling of avascular bone ends in cases of delayed union; even the grafts used were subjected to this process, which was first described by Wildey in 1913. The importance of multiple drilling is the main point of the book. No mention is made of on-lay grafting of the single or dual type. The last portion of the book contains a very useful bibliography. There are also several short but interesting historical sections. This study is a scholarly one and can be recommended to all who are interested in the problems of fractures.

R. G. TAYLOR.

BIOGRAPHY OF BANTING

Sir Frederick Banting. By Lloyd Stevenson, M.D. Second edition. (Pp. 446. 25s.) London: William Heinemann Medical Books. 1947.

Dr. Stevenson gives a most interesting account of the man who was responsible for the discovery of insulin. Born on a farm in Ontario and in no way remarkable at school, Banting went to Toronto University with the intention of becoming a minister. After a year he abandoned this idea and entered as a medical student. Here again he was in nowise remarkable, except for his perseverance and his interest in medical matters. He qualified in 1917 and entered the Canadian Army Medical Corps in the 1914–18 war; he served in France and was awarded the Military Cross for his courage and skill under shell fire. After the war he started in practice in London, Ontario, which proved a disheartening experience; he also worked at the medical school as an instructor in anatomy, physiology, and clinical surgery. It was here that he read the paper by Moses Barron on "The Relation of the Islets of Langerhans to Diabetes, with Special Reference to Cases of Pancreatic Lithiasis." He conceived the idea that it would be easy to make an extract of the islets of Langerhans if the acinous portion of the pancreas had degenerated. Dr. Stevenson's account of the trials, difficulties, and finally the success is very full and most interesting.

After insulin had been isolated his knowledge of physiology was insufficient for working out the new problems and his clinical experience was inadequate for treating patients. He was not easy to work with under these conditions, and he eventually turned to other fields of research. The enthusiasm in Toronto and throughout the world over the great discovery resulted in large funds being subscribed, not only for the manufacture of insulin and the care of diabetic patients, but also to provide a research institute, to which Banting was appointed director. Although he worked hard, and useful work was done in the Institute, nothing of outstanding merit was achieved in his lifetime. Many honours came to him. He was given the Nobel Prize together with Professor McLeod, was elected a Fellow of the Royal Society in 1933, and knighted in the same year. The tragedy of his death in an aeroplane accident is well described.

GEORGE GRAHAM.

COMFORTING THOUGHTS

Peace of Mind. By Joshua Loth Liebman. (Pp. 206. 8s. 6d.) London: William Heinemann, Ltd. 1947.

If a Rabbi who happened to be one of America's leading radio preachers and a Jewish metaphysician to boot were to write on Judaism and tranquillity, it would no doubt be possible for some accredited colleague to say whether his theology was,

within its prescribed limits, sound. If he were to write on dynamic psychology and peace of mind it would certainly be possible for a psychologist to say whether or not his presentation was reliable. But when a "religionist," to use his own words, "attempts to find new answers to the basic problems of human nature," "to explain what modern psychology has discovered about human beings" and "why we lose faith in life and in God," he puts himself beyond scientific criticism. He may be, as indeed Dr. Liebman believes of himself, the bearer of a new idea of God, or he may be, as the success of his book in America suggests, a not too accurate dispenser of bromides.

It is not within the reviewer's province to determine these points. All he can say is that, judged by psychological standards, the book falls flat at the first hurdle. No amount of lip service to Freud—which incidentally Dr. Liebman renders freely throughout his book—can redeem the author's first and irretrievable error about repression. This he describes as the "over-all strategy employed by religion in the struggle against evil"—that is, according to Dr. Liebman, against "sensual thoughts and impulses." It is frankly impossible to take any book on psychodynamics seriously which begins with such a common and constantly refuted error. Indeed the main interest of *Peace of Mind* is the light it sheds on the post-war tendencies of popular psychology in America. Equipped with a bird's-eye acquaintance with psycho-analysis and an equally fleeting and uncoordinated knowledge of psychiatry and "psychosomatic" medicine, the author makes a running survey of the field of mental conflict. The reader might gather therefrom that the aims and techniques of psychiatry can strengthen the therapeutic force of religious belief and *vice versa*. Comforting thoughts, no doubt, for those ready to be so comforted.

EDWARD GLOVER.

Brompton Hospital Reports are always a welcome addition to the library of the chest physician, for in spite of their modest subtitle they include some of the best papers of the year on various chest conditions, medical and surgical. Volume XV (Research Department of Brompton Hospital, 10s.) is no exception. It opens with a short but eloquent appreciation of the late Mr. Tudor Edwards, by whose "passing the Hospital has lost a distinguished surgeon." The first paper is a modified version of his Presidential Address in 1946 to the Association for the Study of Diseases of the Chest on "Carcinoma of the Bronchus." This is a masterly survey of the main advances in knowledge over the past 25 years. No one was more competent than he to sum up these advances in pathology, diagnosis, and treatment, for he had taken a leading place in all three. The last paper is also a Presidential Address, that of Dr. Maurice Davidson to the Section of Medicine of the Royal Society of Medicine. It should be widely published, for his remarks on the present trends in medical policy are interesting and savour of Wilfred Trotter's wisdom and philosophy. In their classical monograph, "The Segments of the Lungs," reprinted from *Diseases of the Chest*, 1945, Foster-Carter and Hoyle review all previous work and give a full bibliography. They state clearly all the investigations necessary for the mapping out of the segmental areas in both lungs, give their radiological features with ample and excellent illustration, and discuss the application of these to medical and surgical problems. The postgraduate student will find this monograph particularly useful because it sums up the advances now possible in differential diagnosis and local treatment by the judicious combination of film examination and bronchoscopy in lung abscess, bronchiectasis, and bronchial carcinoma

The Medical Annual, edited by Sir Henry Tidy and Mr. A. Rendle Short (John Wright and Sons, 25s.), provides in its 65th year its usual wealth of information, and criticism is disarmed by the publisher's apology for its late appearance. The slow tempo of book production is particularly unfortunate in a publication of this type, which undertakes to review the year's work. A random glance at 100 references reveals the effect of the publisher's difficulties, for 45 were dated 1945, 38 1946, and only one 1947. But these minor criticisms do not detract from the usefulness of the book. It is difficult to select specific articles for comment when the range is so wide and the standard so high, but Prof. Crew's review of social medicine, the article by Dr. Swan on rubella and congenital malformations, and that by Drs. Blodgett and Elliott Cutler on the surgical treatment of hypertension would alone make the book a profitable investment. The format and production are in accord with the traditions of John Wright, but, presumably for reasons of economy, the type face is small enough to be inconvenient to all but the most orthoptic.

BOOKS RECEIVED

[*Review is not precluded by notice here of books recently received*]

Hallmarks of Mankind. By F. Wood Jones, D.Sc., M.B., B.S., F.R.S., F.R.C.S. (Pp. 86. 10s. 6d.) London: Baillière, Tindall, and Cox. 1948.

Two lectures on the origin of man and his relation to the monkeys and apes.

Private Enterprise or Government in Medicine. By L. H. Bauer, A.B., M.D., F.A.C.P. (Pp. 201. 25s.) Springfield, U.S.A.: Charles C. Thomas. 1948.

An account of private and State-controlled systems of medical service throughout the world, with special reference to the U.S.A.

Dentists Register. (Pp. 415. 18s.) London: Dental Board of the United Kingdom. 1948.

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SAFEGUARDS SECURED

The Special Representative Meeting called to consider the results of the April plebiscite and the recommendations of Council last Friday brought to an end a debate which has lasted nearly six years by passing the Council's recommendation advising the medical profession to co-operate in the National Health Service. The meeting also had before it a letter from the Ministry of Health outlining the proposed content of the Amending Bill and referring to other matters recently discussed. This letter and an account of the meeting are recorded in this week's *Supplement*. By deciding to co-operate the Representative Body brought B.M.A. policy into line with responsible public opinion, and has confirmed its reputation for sane judgment in the world of medical politics. The meeting was a great occasion for Dr. H. Guy Dain, the Chairman of Council, who dealt in a forthright and stringent manner with the criticisms levelled against the Council and expressed in a motion which was carried deploring the holding of the April plebiscite. It had been the policy of the Representative Body, Dr. Dain said, in matters of the Health Service, that the responsibility for decision should be placed upon the individual members of the profession. During the past years there had been a constantly changing position, and the Council would have been unreasonable if it had not ascertained the views of the profession in the light of the changes taking place. Division of opinion in the Council was reflected in the results of the April plebiscite. The majority of general practitioners to justify collective opposition had not been obtained. "You cannot go back on your undertaking to the people who signed both plebiscites that unless 13,000 general practitioners agreed to stay out of the Service you would not hold them to their vote against coming in. The issue of continued opposition to entrance to the Service cannot be taken up by you to-day in view of the pledge you have given."

Dr. Dain went over the points that had been gained. "What we were most afraid of was the Minister's overall powers. He has now agreed to an Amending Act which will limit his powers in creating a whole-time salaried service." The Minister had agreed that the profession shall always be consulted about Regulations, and be able to put in protests before such Regulations are made. And Dr. Dain reminded the meeting that with one exception the Ministry of Health had for thirty years always dealt with them fairly over Regulations under National Health Insurance. They had, he went on, got the right to freedom of speech and writing properly safeguarded; they had reached the position in which basic salary as a principle had disappeared; they had an agreement that the Medical Practices Committee would nominate the few over-doctored areas and that in the rest of the country a practitioner could set up wherever he liked; they had been able to obtain an important modification in the midwifery service whereby any practitioner, whether on the obstetric list or not, might attend a patient on his list and be paid for it. The Minister had agreed to put into the Act that Executive Councils should elect their own chairmen. He had set up a legal committee to clarify the partnership position set out in Sections 35 and 36 of the Act, and had agreed to amend the Act in accordance with the committee's findings. The Minister had agreed that if substantially more than 17,900 general practitioners join the Service the amount of the compensation (£66,000,000) will be substantially increased. He had agreed that when the Service starts on July 5 the profession can immediately raise through the Whitley Council machinery the betterment factor and the remuneration of the Spens Report. "Therefore," Dr. Dain said, "we are not bound to the present conditions as set out in the remuneration offer if we can prove to the Whitley Council that the amount is not the proper one."

They had not been able to alter the Minister's intentions about the ownership of goodwill. On that point, Dr. Dain observed, we had no support from Parliament or any political party. "What we have tried, therefore, to do," he continued, "is to see how far we can get round this point as well. We had said to ourselves: 'What is it that we own when we own goodwill?' We own the right to choose our partners and assistants, to arrange our work with one another, to say who shall succeed us, and to arrange the performance of our duties. The Minister has agreed that we may do all this so long as money does not pass which is in the nature of payment for goodwill." They had not succeeded in obtaining the right of appeal to the courts, but on practically every other matter, Dr. Dain said, they had succeeded in either getting rid of the difficulties that confronted them or modifying them in such a way that they would be practically non-existent. He had always been opposed to entering the Service if their freedoms were not sufficiently protected, but, in view of the modifications obtained during the last few weeks, "I believe we are now sufficiently protected to be able to say to the profession that not only can we co-operate in the further negotiations but that the safeguards we require have been effectively secured."

Dr. Dain asked whether the things which had not been given were of outstanding importance, whether they were such that would prevent them from taking a proper place in the Service. "When the position of those," he added, "who wish a comprehensive service is satisfied or sufficiently satisfied, then we are left with a cleavage of opinion, which began to appear at the Council meeting, between those who did not want any Service at all and those who were satisfied that the Service was such that we can enter it." They had to face that position and to bear in mind the interests of those not concerned in the Service.

The opposition to Dr. Dain's views found its most effective spokesman in Lord Horder, who considered that the April plebiscite suggested to the profession as a whole that in the minds of the Council "the so-called concessions"

of the Minister were of great importance. Lord Horder probed into the events which took place after April 7 and said that there had been doubt and confusion. "Where," he asked, "did the rot set in? Was it at the centre or the periphery, or both at the same time?" The burning question was whether the situation could be retrieved. The Council, he believed, had acted, and in the recommendations before them was proposing to act, past its mandate. The amendment to which he was speaking asked "that the *status quo ante* should be restored. It calls on the Representative Meeting to arouse itself and resume the fight." Mr. R. L. Newell, a member of Council, observed that he admired the clinical acumen of Lord Horder, but feared that his diagnosis had been warped by the acute symptoms developed in the Marylebone Division. Dr. J. A. Pridham said that the B.M.A. was the only organization outside the T.U.C. which had persuaded the Minister to its point of view. Dr. R. W. Cockshut said that though attached to the principle of retention of goodwill he would hesitate to advise the profession to go into a long and difficult fight on that question, throwing away by doing so all that they had gained; and he reminded the Meeting that the profession had agreed to a comprehensive service for 100% of the population. Dr. S. Wand and Dr. J. A. Brown pointed out that they had gained practically everything except the retention of goodwill in practice. Dr. Dain completed the rout of the opposition in a short and pungent speech. The statement that they had accepted defeat, he said, was nonsense. They had gained the greatest victory against the Government, which had been compelled to accept an Amending Act before the main Act had come into force. The Kingston-on-Thames amendment, to which Lord Horder spoke, was lost by a large majority, and finally the first recommendation of the Council advising co-operation was carried by a still larger majority judging from the show of hands. To this was added the following rider: "That the medical profession should accept service under the Act on the understanding that, in the event of an Amending Act and terms of service being unsatisfactory to the Representative Body, members serving under the Act may hand in their resignations or take such other step as is considered necessary by the Representative Body."

The important business of the day concluded, the Representative Meeting then indulged in heresy hunting. First of all, on a motion from Guildford, the Meeting was called to ask for the resignation of the Council. This was effectively met by Dr. Dain, who submitted that they had won the greatest victory of any profession against the Government, and that nothing in the Council's action justified the Guildford motion, which, on being put to the Meeting, was supported by only two or three out of the three hundred-odd representatives present. Then came a motion from Burnley complaining of "the disastrous effect on the plebiscite of the *B.M.J.* editorials of April 17 and 24," and calling upon the Representative Body for the discharge of the Editor of the *Journal*. If any defence were needed for editorial policy since April 7 it was found in full measure in the principal speech by the Chairman of Council. The leading article in the *Journal* of April 17, under the heading "Mr. Bevan's Gesture," concluded thus: "There is, therefore, everything to be gained in responding to this gesture in a similar manner." By pressing its case in a new atmosphere those who have conducted negotiations with the Ministry of Health and the Minister have quickly reached the position in which the Chairman of Council was able to say to the Meeting: "I believe we are now sufficiently protected to be able to say to the profession that not only can we co-operate in the further negotiations but that the safeguards we require have been effectively secured." If the *Journal* has played any part in this it can receive criticism—even harsh criticism—with equanimity.

It is now up to those who support the B.M.A.'s "wholehearted desire for a comprehensive medical service" for 100% of the population to do all they can to make the new Service as efficient as possible in circumstances which are admittedly difficult. But the difficulties, many and immense as they are, can be lessened by willing co-operation and hard work. The B.M.A. has a big task in front of it in helping to shape the new Service and in securing satisfactory terms and conditions for those who work in it. It has also an obligation to those of its members who wish to stand outside the Service, and will do what is necessary to protect their interests. The B.M.A. has come through the ordeal of six years' debate with enhanced prestige and strength, and by protracted and difficult negotiations has so modified the comprehensive Health Service advocated by all political parties that it is possible for the medical profession to take a foremost and active part in moulding it according to the highest traditions of a learned profession.

SOME DUST DISEASES OF THE LUNG

Since Koch's discovery of the tubercle bacillus tuberculosis has been the most closely studied of the diseases of the chest. It was not until about 1930, when improved technique began to have an effect, that radiological investigation became an essential part of the examination of the chest, and it was soon evident that many dusts caused abnormal shadows in *x*-ray films. Since then there has been much argument about the terminology of these shadows. This is probably a phase which will pass as soon as it is realized that the appearances vary much with the radiological technique. They are only shadows, and the same type of shadow may be caused by collections of inert material in the lymphatic spaces of the lung or by fibrosis in the lung itself. The essential thing to decide is the nature of the pathological process which gives rise to the shadows, the amount of disability that it causes, and the course which the condition is likely to pursue. The next great advance may well follow a study of the contaminants of the air breathed into the lung. These contaminants include not only dusts but gases; in an industrial community there must be some exposure to acid gases such as nitrous fumes, chlorine, and phosgene among others. And it is not only in an industrial community that grave disease of the lung may be caused by dust, for Fawcett[1 2] has shown that farmers in Cumberland may develop extensive fibrosis of the lung after handling mouldy hay, and this has also been reported recently from Switzerland[3] and Sweden.[4]

In this and last week's issues of the *Journal* Dr. C. M. Fletcher gives an account of the work of his research unit in South Wales. In the past three years 10,000 men from that coalfield alone have been certified as suffering from pneumoconiosis. This huge figure shows the seriousness of the problem. The survival of the nation depends on coal, and if the nation is to attract men to this industry and then keep them in it, the dust problem must be solved. It is not of course a problem confined to the coal industry alone but is one with which our other basic industries will also have to contend. The complacency with which the situation has been regarded in the past, and, judging by the lack of teaching in our medical schools, one might almost say is still regarded, is well illustrated by Fletcher's quotations from two Milroy lectures. Shufflebotham (1914) said: "At the present time in Great Britain fibrosis of the lungs among miners can be said to be practically non-existent"; and Collis (1915), "Miners' asthma, common though it used to be, has passed unobserved from our midst, and conjectures as to its character and causation are idle." Yet in 1947 men were certified in South Wales at the rate of 100 a week, and certification has risen in all the other coalfields of Great Britain, the provisional figures for 1947 showing a rise of about 1,000 in that year.

Fletcher thinks that the incidence of the disease is related to quantitative rather than qualitative differences in the dust, though he does not claim that the qualitative differences are of no importance. He has shown that there is no great difference in incidence between steam-coal areas and anthracite areas, and that while the incidence is higher in South Wales than the rest of the country the dust concentration is greater in South Wales than elsewhere. High concentration is due in the anthracite mines mainly to poor ventilation, which was especially bad during the nineteen-twenties, and in the steam-coal mines to the introduction of intensive mechanical methods of mining in the dusty coal-seams of East Glamorgan during the next decade.

In the pathological field Gough's work has been outstanding.[5] The method of cutting sections of the whole lung and mounting them on paper so that they can be viewed side by side with a radiograph taken before death is a most useful contribution to the correlation of *x*-ray appearances with pathological changes. These pathological changes consist of coal foci in the immediate vicinity of which are areas of severe emphysema described by Gough as "focal emphysema," and it is this focal emphysema which is the main cause of the shortness of breath from which these miners suffer. Superimposed on this focal type of disease is a progressive massive fibrosis, often necrotic in the centre and thus containing a cavity. Fletcher has concluded that so long as the disease was confined to coal nodulation and its associated focal emphysema it generally ceased to progress if the man stopped working in a high concentration of dust; but in a great many cases in which massive fibrosis had developed the condition was progressive even after the man had ceased to work underground. It was associated with a raised sedimentation rate, and there was suggestive evidence that it might be tuberculous in origin, the "koniophthisis" of Belt and Ferris.[6] None the less, tuberculosis could often be recognized as a separate disease in addition to pneumoconiosis.

In contrast to the progressive nature of pneumoconiosis in coal-miners, Doig and McLaughlin[7] have recently recorded the present condition of the 15 electric-arc welders who provided them with the material for their description of the condition of welders' siderosis in 1936.[8] Of the six men in whom well-marked radiological changes had been present, two had ceased to work as welders, with the result that the iron oxide was eliminated and the abnormal shadows diminished in intensity. The process here, then, is reversible. The other four men continued to work as welders and still had abnormal shadows on *x*-ray examination, but after 12 years remained in good health. Two of the seven in whom radiological changes were not originally apparent now had developed abnormalities. These radiological changes, which are quite indistinguishable from the early changes of coal-miners' pneumoconiosis, are due to a dust which does not cause pulmonary fibrosis, and therefore the two conditions can be sharply contrasted.

In a recent number of *Tubercle*[9] attention was drawn to the figures of the Registrar-General showing the great increase in carcinoma of lung during the century, which was much more marked in males than in females, and was closely correlated with the increase in cigarette smoking. These figures are of much interest in view of the work of Bradford Hill and Faning,[10] who discovered a high incidence of carcinoma of lung and skin in chemical workers handling an arsenic powder. The incidence was three times as high as in control groups in the same factory and same town. Here, then, an industrial dust gives rise to carcinoma of lung; but it is worth while recalling Thomas and Collier's observation that the arsenic content of cigarette fume may be as high as 10.5 mg. per cubic metre.[11] There is also a growing impression that the incidence of carcinoma of lung is high among those exposed to asbestos dust. This has been reported from France[12] and Germany,[13] and Wyers[14] has suggested that the incidence may be as high as 20% in this country. Asbestosis itself is a most disabling and rapidly progressive disease; yet since exhaust ventilation was installed in the factories in 1930 few cases have developed in persons who were not exposed to the pre-1930 conditions. The industry is therefore an excellent example of the triumph of the engineer over dust.

Holman[15] has provided a historical record of the methods used by mining engineers to suppress dust up to the present time. Now that Fletcher has shown how important in the aetiology of coal-miners' pneumoconiosis is the "quantity" of dust, we can look forward with confidence to our mining engineers devising some means of suppressing the dust and thus eradicating the disease. Indeed Craw[16] has already suggested that the Wetherill dust-allaying projector, introduced into the Cumberland

1 *Brit. J. Radiol.*, 1938, **11**, 378.
2 *Amer. J. Roentgenol.*, 1938, **39**, 19.
3 Hoffman, W., *Schweiz. med. Wschr.*, 1946, **76**, 988.
4 Törnell, E., *Acta med. scand.*, 1946, **125**, 191.
5 *Occup. Med.*, 1947, **4**, 86.
6 *Spec. Rep. Ser. med. Res. Coun., Lond.*, No. 243, 1942. H.M.S.O.
7 *Lancet*, 1948, **1**, 789.
8 Ibid., 1936, **1**, 771.
9 *Tubercle*, 1948, **29**, 40.
10 *Brit. J. industr. Med.*, 1948, **5**, 1.
11 *J. industr. Hyg.*, 1945, **27**, 201.
12 Giroux, M., *et al.*, *Sem. Hôp. Paris*, 1947, **23**, 1820.
13 Linzbach, A. J., and Wedler, H. W., *Virchows Arch.*, 1941, **307**, 387.
14 Glasgow Thesis, 1947.
15 *Brit. J. industr. Med.*, 1947, **4**, 1.
16 Ibid., 1947, **4**, 30.

iron ore mines in 1935, has reduced the dust from many millions of particles per ml. to an average of 2,500 particles per ml., and together with strict medical control has eliminated silicosis from the mines. The insistence on medical control is important, and it is amazing that Fletcher should have to make a special plea to get established such an obvious procedure as periodical *x*-ray examination.

DIETETIC TREATMENT OF HEPATIC CIRRHOSIS

A form of cirrhosis closely resembling Laennec's cirrhosis in human beings can be produced in experimental animals by purely nutritional means,[1 2] and this has led to the hope that established cirrhosis in man might prove amenable to dietary therapy. This hope is further enhanced by the observation that some forms of experimentally induced cirrhosis pass through a reversible phase from which complete anatomical recovery is possible,[3] but unfortunately the reversible phase cannot be distinguished histologically from the irreversible. Two factors in the diet are of outstanding importance to the liver—namely, choline and the thioamino-acid cystine—and deficiency of either leads to a characteristic and specific hepatic lesion.[4] That resulting from choline deficiency is a gradually increasing fatty infiltration, progressing to fibrosis and culminating in so-called portal cirrhosis; cystine deficiency causes a massive type of necrosis resembling acute yellow atrophy and ending either in death or in recovery with post-necrotic scarring and nodular hyperplasia. Connor[5] has called particular attention to the former sequence of events—fatty infiltration preceding cirrhosis—in the genesis of alcoholic cirrhosis in man, and it is principally against the accumulation of fat in the liver that nutritional therapy is directed.

Owing to conflicting reports on the efficacy of such therapy in hepatic cirrhosis a study has been made in Best's laboratory in Toronto of the effects of various nutritional factors known to affect the liver upon the cirrhosis produced in rats by chronic poisoning with carbon tetrachloride. The results are published in our opening pages. Two important conclusions can be drawn from them: (1) there is a close relation between the fat content of the liver and the progression of the cirrhosis; (2) all factors that arrest or reverse the cirrhotic process are lipotropic—that is, they prevent the deposition or facilitate the removal of fat from the liver cells.

A more rational and presumably more successful use of dietary therapy might be expected from a better understanding of the mechanism by which fatty infiltration produces cirrhosis. Though there is no general agreement on this matter, strong evidence exists that the action is largely mechanical and due to impairment of the intralobular circulation. It is of especial interest that a similar mechanism has been suggested to account for the centrilobular zonal lesions that result from carbon tetrachloride poisoning.[6] In both cases impairment of the intralobular circulation has been demonstrated by *in vivo* microscopy and by perfusion techniques. It is the resulting malnourishment and anoxia of the centrilobular liver cells that leads to their atrophy or necrosis and consequent fibrous replacement. Since methionine is no more effective in preventing or curing cirrhosis than choline in equivalent lipotropic dosage the centrilobular injury cannot be the result of thioamino-acid deficiency. It seems more probable that anoxia is the most important consequence of impaired intralobular circulation, though deprivation of other essential metabolites cannot be excluded.

Recently some exceptions to the correlation between fatty infiltration and hepatic cirrhosis have been recorded. Handler and Dubin[7] observed that severe fatty infiltration of the liver could be produced in rats on a diet containing as much as 18% of casein if 1–2% of nicotinamide was incorporated, but that cirrhosis did not appear even after six months on this diet. Hypothyroidism also leads to accumulation of fat in the liver, but despite this the subsequent development of fibrosis is retarded.[8] The explanation of these discordant findings probably lies in the relation between metabolic activity and blood supply. A degree of vascular impairment that proves fatal at one level of metabolic activity may be quite adequate for maintenance at a lower level. Thus fatty infiltration causing intralobular circulatory insufficiency may result in centrilobular liver injury if normal thyroid activity or hyperthyroidism is present but might have no effect in association with hypothyroidism.

The fundamental change underlying the transition of reversible to irreversible cirrhosis must be one of great importance. Cameron and Karunaratne[3] state that "we know of no histological features by which the two stages can be distinguished." Since, however, the genesis of dietary cirrhosis, and probably of carbon tetrachloride cirrhosis, is closely related to circulatory impairment, it is not inconceivable that reversibility is retained so long as the intralobular circulatory impairment is mainly the result of sinusoidal compression by distended liver cells. A stage, however, is ultimately reached at which the contraction of the fibrous tissue and the formation of regeneration nodules so distorts the vascular tree[9] that sinusoidal compression becomes of secondary importance. At this stage the cirrhosis becomes irreversible, in the sense that neither cessation of exposure to toxic agents nor the administration of lipotropic agents can significantly affect the intralobular circulation. With carbon tetrachloride cirrhosis in rats this stage is reached after about 5 months' exposure, and the maximal period of exposure in the experiments recorded by Best was well within this period.

On the basis of these nutritional experiments on animals by Best and others a more optimistic view of the treatment of human cirrhosis is justifiable, but the indiscriminate blunderbuss therapy with proteins, amino-acids, and vitamins of the B complex is to be deprecated. Good results can be expected only if attention is given to the following points. First, the disease should still be in the reversible phase. Secondly, continued exposure to hepatotoxic agents

[1] György, P., and Goldblatt, H., *J. exp. Med.*, 1939, **70**, 185.
[2] Chaikoff, I. L., Elchorn, K. B., Connor, C. L., and Entenman, C., *Amer. J. Path.*, 1943, **19**, 9.
[3] Cameron, G. R., and Karunaratne, W. A. E., *J. Path. Bact.*, 1936, **42**, 1.
[4] Himsworth, H. P., and Glynn, L. E., *Clin. Sci.*, 1944, **5**, 93.
[5] Connor, C. L., *Amer. J. Path.*, 1938, **14**, 347.
[6] Glynn, L. E., and Himsworth, H. P., *Clin. Sci.*, 1948, **8**, 235.
[7] Handler, P., and Dubin, I. N., *J. Nutrit.*, 1946, **31**, 141.
[8] Handler, P., *J. biol. Chem.*, 1948, **173**, 295.
[9] McIndoe, A. H., *Arch. Path.*, 1928, **5**, 23.

must be avoided. Thirdly, administration of lipotropic agents is indicated only if the cells are laden with fat, and consequently the prognosis is better in cirrhosis in those with swollen than in those with shrunken livers. Fourthly, the metabolic activity of the liver should be reduced so far as possible. Protein in large quantity, as commonly advised, probably neutralizes, by its stimulant effect on metabolism, the advantage gained by the lipotropic action of some of the constituent amino-acids. Finally, the use of antithyroid drugs might be considered worthy of trial.

DANGEROUS TALC

It is only within the last forty years that the use of sterilized rubber gloves has become a standard part of surgical operative technique. In thus reducing the risk of bacterial infection the surgeon has unwittingly introduced a new wound hazard whose harmful potentialities are only now becoming recognized. It is customary to sterilize gloves by steam, and talc powder is used to prevent them from adhering and to facilitate the insertion of the hand. The outside of the gloves is left covered with adherent talc and the tip of each finger commonly contains a somewhat larger quantity. Since talc sticking to the gloves after steam sterilization is not easily removed by rinsing in saline or water, handling the exposed tissues with such gloves introduces talc into the wound. If in the course of operation the fingertip of a glove is perforated, the talc accumulated inside may escape into the wound in dangerous amount, particularly if the puncture is unnoticed.

The effects of talc in the tissues were first recognized by Antopol[1] in 1933 and confirmed by Feinberg[2] and Gardner[3] four years later. German[4 5] described the characteristic follicular giant-cell reaction and by 1943 had collected 50 cases of talc granuloma following laparotomy. He showed that the talc particles often became widely distributed in the abdominal cavity before setting up a reaction. A new aspect of the unforeseen harm done by talc was revealed by Roberts,[6] who showed that granulomatous lesions of the Fallopian tubes might result from the intratubal migration of talc particles introduced during a previous appendicectomy, and that sterility was the usual consequence. At a recent meeting of the Association of Clinical Pathologists Cappell and Faulds both mentioned the occurrence of tubal siliceous granuloma following diagnostic insufflation of the Fallopian tubes.

Three papers on the subject of siliceous granuloma appear in this issue of the *Journal*. Mr. Arthur Mackey and Dr. J. B. Gibson draw attention to the greater density and severity of adhesions after laparotomy as compared with those resulting from purely bacterial inflammation in the unopened abdomen, and they provide striking evidence that such adhesions may be brought about by talc within so short a period as 13 days. Dr. W. Walker describes fatal intestinal obstruction occurring only seven weeks after laparotomy and shows that the adhesions causing the fatality contained abundant talc crystals. Dr. G. Harvey Smith adds to the tubal group a case previously reported as tuberculosis (associated with carcinoma of the uterus).

There is no doubt that complications from the use of talc are much more common than is generally realized. Postoperative adhesions are not often examined microscopically, and even then their fundamental cause may escape detection unless the sections are studied by polarized light, when the anisotropic character of the talc particles renders them conspicuous, as is shown clearly in the photomicrographs elsewhere in this issue. The newer "polaroid" screens enable the histologist to detect double-refraction with the minimum of trouble; they are so much simpler in practice than Nicol prisms that they should be in constant use in every pathological laboratory in the routine examination of microscopical preparations.

These papers emphasize that talc can produce a variety of lesions, some of which may fortuitously become lethal. The finding of an acceptable substitute is therefore an urgent problem. Lycopodium power is equally harmful, and potassium bitartrate, proposed by Seelig[7] as a substitute, is unacceptable because of its macerating effect on the hands. What is wanted is a colourless powder with the lubricant properties of talc or graphite, unaffected by steam sterilization, and giving rise to no reaction in the tissues. The problem is one first for the chemist, but, until an acceptable substitute is found, surgeons aware of the potential dangers of talc could minimize the risk by insisting that there should be no excess powder in the tips of their gloves before inserting the hands, and by removing all surplus talc from gloves before handling the exposed tissues.

1 *Arch. Path.*, 1933, **16**, 326.
2 Ibid., 1937, **24**, 36.
3 *Amer. J. Path.*, 1937, **13**, 13.
4 *Amer. J. clin. Path.*, 1940, **10**, 245.
5 *J. Surg.*, 1943, **76**, 501.
6 *Brit. J. Surg.*, 1947, **34**, 417.
7 *J. Amer. med. Ass.*, 1943, **123**, 950.

PERSONNEL SELECTION

Some of the opposition to tests for the selection of candidates derives from the misconception that they are applied in a mechanical way "from the book" and that the results are right or wrong according to some predetermined scheme. As Lord Moran[1] said in the debate on entry into the Civil Service in the House of Lords on May 26, "When a callow youth who has never heard a shot fired in anger confidently claims that by his psychological tests he can tell whether an upstanding lad who has done well in the front line should or should not have a commission, naturally . . . soldiers and sailors grow impatient." It is essential that those who perform these tests should be experienced people—and more than merely experienced at setting tests. This condition is fulfilled at CISSB, where candidates for the Civil Service undergo tests of personality and intelligence for 48 hours. Some of the abundant evidence that may be obtained by such methods is described at p. 1094 of this issue. Whether what is discovered about candidates is in fact true, and whether the correct inferences are made from it, can be decided only by following up their careers for many years. The evidence from cases followed up so far indicates that the CISSB tests are helpful and not misleading, and the Foreign Office is so impressed by them that it requires all its candidates to attend the "house party"; only 25% of candidates for the administrative class of the home Service do so.

We would emphasize that the examiners applying tests for such qualities as "contact" with other people, vigour of thought, or ability to collaborate, negotiate, or win confidence must be people of great experience and mature judgment, for their opinions are often arrived at intuitively. Lord Lindsay of Birker expressed many people's fears when he said in the same debate, "I think you must restore the solid evidence of achievement in a big written examination, because all other things are so extremely subject to personal judgment." He was deploring the proposals of the Foreign Office to dispense entirely with the long written examination, and so far as medicine is concerned there is no doubt that these must remain. But it is doubtful

1 *Hansard* (House of Lords), May 26, 1948.
2 *Report of the Inter-departmental Committee on Medical Schools* ("Goodenough Report"), 1944. H.M.S.O.
3 *The Training of a Doctor*, 1948. London: Butterworth.

whether the evidence of learning they provide is much more objective than the evidence relating to personality elicited by suitable tests. Two candidates know all about the differential diagnosis of lobar pneumonia, yet one expresses himself lucidly, the other in a more orderly fashion; the first reveals a widely cultured mind, the second a penetrating and logical one. Intuition enters into judging these qualities, yet many who disparage personality tests seem to forget this. Experienced examiners are accustomed to forming judgments with the help of intuition based on well-designed tests. The tests need not elicit answers that can be only right or wrong; indeed, they are often not of this kind. The Civil Service Commissioners are continually testing their methods in the only possible way—by following up their results.

Tests of "intelligence" are useful adjuncts to tests of knowledge, and are used as such at CISSB. The candidates must have taken or be warranted able to take at least a second-class honours degree. Critics of them often argue that intelligence as well as learning is revealed in long written examinations, but there can be no doubt that long examinations tend to favour the "swotter" at the expense of the man who is equally or more intelligent but who has interests outside his textbooks. The bookworm is not now wanted in the Civil Service, and places for him in medicine are few. Unfortunately the scholarship system (apart from the selection of Rhodes scholars) encourages schoolmasters to train mere scholarship winners, often to the detriment of their health and character. If tests of personality and intelligence were widely adopted in selecting suitable candidates for higher education, the quality of school education as well as of the people who finally qualify for a profession or other occupation might be greatly benefited. Men are not horses to be trained for the Derby and then put to stud. The B.M.A., in its evidence to the Inter-departmental Committee on Medical Schools[2] attributed "some of the inefficiency which undoubtedly exists in the profession to-day" to the fact that a number of students were entering the medical schools who could pass examinations but had not the requisite aptitude, character, or staying power for a medical career. Recently the B.M.A. Medical Curriculum Committee[3] has emphasized the need for experimenting with such tests, and, further, for reviewing "the suitability of the medical student to continue his course at later stages of the curriculum."

Aptitude tests can be properly designed only if a detailed job-analysis is first carried out. We understand that the Civil Service has done this. The problem for the medical profession is more complex. In the first place men with a much greater diversity of aptitude and temperament can become successful and contented doctors; in the second, the tests would be applied to a youth at the end of his schooling instead of to the semi-finished product of a university. The "house parties" at CISSB are an instructive example of how our administrators are trying to select people who will rule us intelligently and humanely.

CARBON TETRACHLORIDE POISONING

Like many other chlorinated hydrocarbons, carbon tetrachloride when inhaled in large quantities may seriously damage the liver. It also has a special affinity for the renal tubular epithelium, and, though in many of the reported cases of acute intoxication (frequently from the use of fire extinguishers) the hepatic symptoms have been most obvious, in others evidence of renal involvement has overshadowed that of disturbance of liver function. In such cases, in which oliguria or even complete anuria may be accompanied by hypertension and severe azotaemia, the prognosis is perhaps worse than in those where hepatic injury is the more evident. It has been found both in animals and human beings that after single heavy exposures to carbon tetrachloride the liver parenchyma is capable of rapid regeneration. It appears that this process of repair can also take place in the damaged renal tubular epithelium, but less rapidly and less completely than in the liver, and unless functional restoration corresponds with anatomical the outcome is almost certain to be fatal.

Treatment in such "renal" cases must therefore be directed primarily to the kidneys, though accompanied by those measures which have been found valuable when the liver is chiefly involved. These measures, and particularly dietary treatment, are discussed at length elsewhere in this issue. In recent years peritoneal lavage and the use of the artificial kidney have been increasingly tried as a means of eliminating toxic end-products of metabolism during periods of suppressed renal function, since it has been shown that numerous substances such as urea, sulphates, phosphates, creatinine, and other waste products are filtered freely across the dialysing surface of the peritoneum.

Peritoneal dialysis is not an operation to be lightly undertaken, since it entails certain risks, not the least of which is lethal peritonitis, and its use should be restricted therefore to cases of acute renal failure associated with reversible renal changes. A recent case[1] of acute carbon tetrachloride poisoning in which the procedure was used certainly fulfilled these conditions, because oliguria had been present for nine days when peritoneal lavage was begun, and subsequent histological examination showed some degree of anatomical regeneration of the injured kidneys. To the dialysing fluid used—modified Tyrode's solution—was added the sodium salt of heparin to inhibit the formation of fibrin on the peritoneum and penicillin to inhibit bacterial growth. When peripheral oedema indicated that fluid was probably being absorbed from the peritoneal cavity into the circulation the constitution of the irrigating fluid was further modified by decreasing the amount of sodium chloride and increasing that of sodium bicarbonate, so that a closer approximation to normal blood plasma was obtained. Unfortunately, in spite of an initial subjective improvement following peritoneal lavage, the patient developed progressive symptoms of exhaustion, bronchopneumonia, and pulmonary oedema, and died ten days after admission to hospital.

The presence of new cells in the tubular epithelium showed that in this case some degree of anatomical regeneration was taking place. These cells had replaced the injured elements, but they were apparently immature and probably not capable of normal function. It was thought that if life could have been maintained for a few more days restoration of function might also have been achieved, with the prospect of complete cure. In a similar though less severe case of carbon tetrachloride poisoning with renal symptoms predominating, complete cure did take place under conservative therapy only, with a return of the blood pressure to normal and disappearance of evidence of renal disease.[2]

These cases emphasize the necessity of recognizing that the chief point of attack of carbon tetrachloride may be the kidneys rather than the liver, and of instituting treatment as early as possible with the object of maintaining renal function until the process of repair is established. The urgency of functional restoration must constitute the justification for such a relatively drastic measure as peritoneal dialysis.

[1] Pearson, C. C., *Proc. Mayo Clin.*, 1947, **22**, 305.
[2] Clinton, M., *New Engl. J. Med.*, 1947, **237**, 183.

PROBLEMS OF INTERNATIONAL TRAVEL

BY

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Special disease hazards result from the increasing speed of international traffic, and the gravity of these problems more than warrants a periodic examination of the situation. However, there is another aspect which is apt to be neglected in medical writings but is nevertheless important in world affairs—the effect of medical decisions on international trade and travel.

From the earliest days there has been an increasing tendency to avoid too drastic interference with traffic by quarantine practice. In his comprehensive review Stock (1945) shows that the elucidation of the causes and modes of spread of various diseases has been followed, if tardily, by an increasing international concord in reducing arbitrary medical action against traffic between countries. Stock also indicates how recent conventions have been designed to define the *maximum* measures consistent with disease control which any country may take against the people and trade crossing her borders. These modern agreements in theory, therefore, abolish unrestricted action by any country against international traffic. Nevertheless the conventions remain as compromises between modern epidemiological opinion and the demands of some authorities.

Medical Certificates

The emphasis given to some present questionable quarantine procedures has arisen paradoxically with the newer knowledge of disease spread and control. The development of immunology, for instance, has had repercussions on quarantine methods. The international traveller is increasingly being harassed by demands for certificates of vaccination against a lengthening list of diseases. The vaccination certificate has received special prestige in connexion with yellow fever, and the various processes now linked with such documents constitute a distinct obstacle to the free movement of peoples in many parts of the world.

If the yellow-fever certificate could be accepted as evidence of an absolutely reliable barrier to the spread of yellow-fever virus then no trouble would be too great to enforce its possession by all travellers. In my view the reliance placed on this document is frequently misplaced. The success of vaccination in developing a high degree of immunity in most individuals is well established. Vaccination is therefore justly accepted, but there is a considerable difference between recognizing vaccination against yellow fever as a reliable procedure and acknowledging the obligatory certificate as beyond reproach.

A yellow-fever vaccination certificate is a document, whether on an official standard form or not, which may or may not be indicative of a high level of immunity in its holder. There are both innocent and discreditable reasons for this doubt. Many certificates honestly issued are not an index of high immunity because of defects in the production and the maintenance of the viability and potency of the vaccine actually injected. Other certificates are bogus. Forgeries and alterations have occurred on a not inconsiderable scale. This danger has been recognized by the wise architects of the conventions, but as yet no fool-proof and practicable counter to the illegal and doubtful document has been evolved. The devices of standard forms and lists of approved vaccinators are but partial remedies. Lists of approved medical officers of all the countries of the world will naturally be changing so continuously with additions, deletions, amendments, and transfers that only large bureaux can hope to compile and maintain such lists. In addition checking and deciphering signatures and designations in many languages is a laborious and difficult task unlikely to be done efficiently at most frontier posts. There is but slight similarity with immigration passport practice. A suggestion useful in theory but unlikely to appeal in practice is the assumption of quarantine control by an international authority. In the present state of the world even such a limited surrender of sovereign rights is bound to be unacceptable to most States.

That a prescribed vaccination certificate is not necessarily proof of a high level of immunity against yellow fever is only one weakness of this quarantine requirement. An equally valid criticism is that not all travellers in the particular geographical regions carry certificates. At present with air travel largely in the hands of established reputable air transport services most air travellers carry certificates. But the era of the private and charter plane is well launched, and it can be prophesied that these planes will rapidly enter inter-territorial travel in vast numbers. Little imagination is necessary to foresee the difficulty if not impossibility of applying quarantine restrictions to such craft. Land- and water-craft are also passing from endemic to non-endemic areas at speeds which bring them well within the yellow-fever danger limits. Their human complements rarely carry vaccination certificates.

The theory of the statutory yellow-fever vaccination certificate is that it implies the exclusion of carriers of virus from non-endemic areas. As the certificate is itself not always trustworthy, and as not all potentially dangerous travellers carry certificates, reliance on such a method alone is foolhardy. Even the rigid control and discipline possible in the best-organized military medical services in the recent war did not overcome these difficulties. How much less can it be expected that civilian administrations with their usually weaker control and looser organizations will achieve greater success ?

The yellow-fever certificate fashion is spreading. Yellow-fever vaccination is at least highly reliable, but it is with much less assurance that complete protection can be expected in every individual vaccinated against such conditions as plague, typhus, and cholera. Thus there is smaller justification for requiring certificates against these diseases. Another unsatisfactory development is that some authorities, though their territories harbour endemic infections, demand vaccination certificates against these conditions for passing travellers. As a measure of control this seems particularly futile.

Medical Examinations

Medical examinations of passengers are not a normal routine at most quarantine posts. When applied, however, they are exceedingly drastic in their effect on both travellers and traffic. The most superficial clinical examination causes delay, annoyance, and frequently confusion, and the value of such examinations as a quarantine measure is very limited. Manifestations of infection are so protean that, even in such a frank disease as smallpox, clinical examination, whether thoroughly done by experts or not, is unlikely to detect all affected persons. Further, since the dissemination of infection is a function of such varied contributors as frank, atypical, and incubating cases, subclinical infections, and carriers, it is clear that elimination of the frank and the atypical cases—the most to be expected from clinical tests—cannot stop spread.

Military experience is again a valuable practical test of such procedures. One convoy embarked its troops in West Africa, where they had had the usual critical pre-embarkation medical examination. All sick soldiers were rejected and a clinically healthy population began the voyage to the Middle East. At Cape Town this convoy reported outbreaks of chicken-pox, dysentery, and meningitis. Vigorous medical action was taken, resulting in all cases and contacts being landed. Again the convoy proceeded, but merely to report further cases of meningitis and chicken-pox at Aden. A further weeding out at this port was also unsuccessful and fresh cases were still appearing on arrival at Suez. The many appearances of smallpox and the lesser exanthemata in troopships may also be mentioned as illustrating the futility of ordinary clinical examinations in filtering off infection. Laboratory techniques are similarly too crude or too cumbersome as yet to demonstrate invariably the presence in human beings of disease agents. Yet in times of crisis many nervous quarantine authorities give way to the hysteria of the occasion and demand, for instance, the wholesale examination of stools from every unfortunate passenger on ships suspected of harbouring cholera.

Many other examples could be given to show that, despite military control and discipline, after the isolation of frank cases and the removal of contacts infection still persisted. The less adequate control and facilities possessed by the average civilian quarantine organization give still less hope of removing infection, especially when it is realized that much human movement occurs beyond any possible official supervision.

Disease Vectors

The rat and the mosquito are the two vectors of human disease prominent in quarantine regulations. The reliance frequently placed upon frontier station methods for preventing the ingress of these potential carriers of plague, yellow fever, and malaria is often unjustifiable. The degree of attention given to vector control is inclined to vary according to the type of vessel or aircraft. Modern ocean-going liners and air-transport of the well-known lines, usually conscientious in observing regulations, receive the most detailed inspection by quarantine authorities. All too often the more careless and hence more dangerous craft, such as small tramps, coastal and local sailing vessels, barges and private aeroplanes, escape the full application of vector control. Land transport—trains, motor vehicles, animal-drawn transport, and caravans—is too often completely ignored or forgotten. Thus reliance on frontier vector control alone is risky. Though fortunately not generally a major cause of obstruction or delay to international transport, arbitrary action under the relative clauses of vector control in international conventions does occur. There have been occasions when officious or too nervous administrations have used the legislation to hold up ships unnecessarily for many days while searching for *Aëdes aegypti* or to submit ships already in possession of satisfactory certificates and patently free of vermin to further anti-rodent measures.

Some General Criticisms

The retention of outmoded views on infection and epidemiology in spite of the spirit and principles of existing international quarantine legislation is also the source of certain general reactions on the part of many health administrations. First, the barrier motive behind vaccination certificates, frontier medical examinations, isolation of sick and contacts, and frontier vector controls has produced an all too common complacency. It is a medical Maginot Line complex which, however fitting in the days of well-marked caravan and trade routes and stable populations, is out of place in the restless modern world. The emphasis given to quarantine measures is especially wrong when there is but spasmodic or inadequate attention given to the more important internal preventive organization. A true perspective would give precedence to the latter in rodent destruction against plague, *Aëdes* control against yellow fever, louse control against typhus, and improved sanitary and health conditions *within* the community. Weaknesses in the barriers against the entry of infective agents which the realist must accept as almost inevitable at present will not then be so very important.

Secondly, the present legislation and practice foster unreasonable allegations concerning the origin and spread of infection which too frequently provoke inter-territorial irritation. A region suffering an outbreak of one of the major communicable maladies is prone to place the blame not on its own inadequacies but on the alleged neglect or even malice of its neighbours. Communities in which a particular disease is endemic are not above seeking the explanation of recrudescences in imported infection. Such forms of recrimination are illogical, unscientific, and unhelpful in view of the demonstrable inherent weaknesses in barrier methods of quarantine practice. When this tendency to arouse international sensitivity is associated with interference with traffic, quarantine methods of doubtful medical advantage are hard to defend.

Thirdly, under existing conditions many health administrations, especially in an increasingly bureaucratic era, are often forced against their better judgment to apply the full armamentarium of quarantine. They appreciate that in the occurrence of any untoward event a scapegoat is likely to be sought. Any omission in observing the convention commandments, whether defensible on technical grounds or not, is apt then to arouse severe censure. Conversely other administrations, indifferent to lax internal conditions, conceal their deficiencies behind a façade of frontier medical activity in terms of the conventions.

Some Recommendations

In this age of speed the medical administrator would welcome above all reforms which would lessen his fear of such conditions as yellow fever, smallpox, plague, typhus, and other major aerial and vector-borne hazards. If such alterations in sanitary conventions and quarantine practice simultaneously benefit international relationship and transport they call for early adoption. As many of the prohibitions and absolute obligatory provisions of the present conventions are here claimed to be both ineffective and indirectly harmful there seems to be no justification for imposing yet more drastic frontier controls. The revision sought is rather an acceleration of the process implemented by the experts of the Office d'Hygiène Publique International, the Health Organization of the League of Nations, and U.N.R.R.A., which has been to define international control in harmony with epidemiological principles.

It is suggested that a considerable advance in the legislation is now possible which, far from reducing control over the origin and dissemination of disease, will enhance it and yet enable travel and trade to move more freely. The following principles therefore deserve prominence in the new international sanitary conventions.

(1) In view of the complex epidemiology of most major communicable diseases and of the insuperable administrative difficulties of achieving satisfactory medical control of international traffic, each State, however weak, should rely primarily on internal measures for increasing resistance rather than on efforts to prevent the entry of infection. With population movements

increasingly disturbing the "epidemic constitution" of both national and international human "herds" it is only the application of this principle which will protect the public health.

(2) Each State should recognize that there is no quarantine measure yet available which can be accepted as of anything but very limited and relative value in excluding infection from a community.

(3) It should be recognized also that no existing quarantine measures are infallible in the diagnosis of infection. Consequently allegations against other countries of "exporting" infection are fruitless.

(4) Medical advantages of any international procedure must be balanced against disadvantages imposed upon communications and trade in a world increasingly dependent upon and dominated by facilities for rapid transport.

(5) The conventions should clearly state that any application of measures in excess of those prescribed will bring repudiation by the international health authority.

If such principles are adopted it will then be questionable whether certain present absolute legal prohibitions and sanctions can be retained in the new conventions. The following may be instanced as requiring re-examination:

(*a*) The *obligatory* possession of immunity certificates by travellers. It is perhaps unnecessary to emphasize that the suggested deletion of the absolute legal requirement in no way diminishes the desirability of all travellers being persuaded to accept immunization. Furthermore, the change in emphasis from frontier barriers to internal protection will imply the need for large-scale programmes of vaccination for population at special risk.

(*b*) The forcible detention or delay of ships, aircraft, and land-craft for medical examination of the crew, passengers, freight, or accommodation.

(*c*) The examination, detention, or removal of contacts or suspects with consequent delay of craft.

These last two sanctions have been abused so often that their reduction, especially in the face of their doubtful usefulness, is overdue. It is not the purpose of this paper to review the other features of international sanitary legislation and practice. The establishment of epidemiological bureaux, the exchange of epidemiological and medical intelligence, the investigation of health problems, the programme of health and medical education, the improvement of the conditions of ships, aircraft, sea- and air-ports, and many other excellent results of the sound construction of the conventions are fully acknowledged. It is also not necessary to refer to the vast prospect of mutual co-operation and regional co-ordination now opening with the appearance of the new World Health Organization.

The removal or reduction of obligations and practices in the conventions which are scientifically unsound or administratively impossible should enhance the value and status of all international medical legislation and agreement. There should then follow a better approach on the part of health administrations to both their internal and external responsibilities, which in turn must lead to improved health and well-being for their communities. Such a reorientation in the sphere of international medicine will be a direct contribution to fuller and more harmonious international relations.

Summary

Much medical interference in world traffic still exists in spite of the advance in international sanitary legislation. This partly arises out of the increasing demand for travellers to hold vaccination certificates and to submit to medical examinations, and partly to medical interference with shipping and aircraft. Arguments are put forward suggesting that such restrictive quarantine medical practice is of limited value and is dangerous in creating a false sense of security. It cannot guarantee exclusion of infection and is no protection against the recrudescence of endemic disease. It leads to the neglect of more valuable internal measures for improving medical organization and sanitary conditions. It also contributes to inter-territorial friction.

There is thus a need for the international sanitary conventions now being revised to reduce "police" measures, to emphasize national self-reliance and responsibility, and to clear the way for better national health services and world transport less shackled with medical restrictions.

REFERENCE

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SELECTION OF CIVIL SERVANTS

[FROM A CORRESPONDENT]

The Civil Service has acquired the unfortunate (and perhaps unjustifiable) reputation of recruiting men of first-class intellectual ability but of indifferent personality, or, if it succeeds in attracting men endowed with humanity, vigour, decisiveness, and sound judgment, of so restricting the development of these qualities that their possessors in time become timid, brittle, hermetic. Many people may have been surprised, therefore, when Sir Percival Waterfield, the First Civil Service Commissioner, recently defined the qualities required in the administrative class of the home Civil Service or the senior branch of the Foreign Service as "brains, personality, effectiveness, judgment, and integrity, the whole blended into a sane and balanced individual by the process of education."

The old opinion of our administrators was perhaps not wholly a myth; the administrative class of the Service was formerly more remote from professional, trade union, and business interests than it is to-day. Its staff must now sometimes mix in the rough world outside Whitehall, and the Civil Service Commissioners are therefore trying to recruit a rather different type of man or woman and to prevent the entry of those who, though highly intelligent, have not the capacity for personal negotiation and humane administration. They have now the additional problems of obtaining staff for vacancies that occurred during the war but were not filled, and of selecting men and women who were not then free to enter but who can now apply—people whose ages range up to 32. One method that they are using is the 48-hour "house party," where personnel selection tests are applied. The Civil Service Selection Board—CISSB for short—which was set up in August, 1945, holds these examinations at a delightful country house at Stoke d'Abernon, in Surrey. As an observer I recently joined a "party" and watched the candidates being put through their paces.

At present all vacancies in the Foreign Service and 25% of those in the administrative class of the home Civil Service are filled by candidates who have been through CISSB. They must have obtained, or be certified by their tutors as able to obtain, at least a second-class honours degree, and they must have passed a qualifying written examination on general topics, where also they must show that they can express themselves clearly in good English. About 40% of the candidates fail at this stage. CISSB does not pass or fail the other 60%: it elicits evidence and makes recommendations; a Final Selection Board accepts or rejects the candidates.

The CISSB staff is drawn from the Civil Service, the universities, the Forces, business, and elsewhere, and includes a number of trained psychologists. In addition to this diversity of experience they are helped by confidential reports on each candidate from his school, university, employers, and commanding officer, and by the candidate's personal references.

Mental Tests

When I arrived the candidates had already been given numbers, by which they are known throughout the test, been sorted into three groups of six to eight (seven is considered the most suitable number), and were drinking tea copiously but in a subdued manner to refresh themselves after two hours' mental testing during the afternoon. These tests are of two kinds—cognitive and projection. The former are "intelligence" tests specially designed for this type of sample of the population and are performed at high speed against the clock; only

the most able succeed in completing them. The first, a general information test, consists of a long list of names of notable men and women in all walks of life which any diligent newspaper reader with a retentive memory ought to know; against this list is a column of descriptions, arrayed in a quite different order, by which they can be identified; the candidate is required in a third column to mark the description that fits the name. On the whole this test is not difficult for the man who has a practical and varied interest in public affairs.

Their perceptual efficiency is then tested by means of simple line diagrams. A standard set is shown, and then 200 fragments of one or other of those in the sample must be identified as being detached from one of the complete diagrams. People with mathematical or mechanical ability tend to excel in this test. Two word tests follow. In the first a list of words lies beside a list of half words. Each half word has to be completed so that it means much the same as its mate—e.g., lucky, for*tunate*. The second is two lists of words with a blank column between them. Into the space between each pair of words the candidate must insert a word that rhymes with the first and means the second—e.g., lucky, *plucky*, courageous. Facility in the use of language is naturally a help in performing these tests.

Finally a number of paragraphs, some of considerable complexity, extracted from official documents are shown to the candidate together with a list of inferences that may or may not be truly made from them. He is required to mark the correct inferences. This test sets just those problems that will often beset the Civil Servant, and, though they struck me as formidably dull, several candidates whom I subsequently asked about them all replied that their interest had been aroused.

The projection tests give some insight into a candidate's personality. A number of photographs of mildly emotive human situations are thrown on to a screen; they depict perhaps a man parting from a woman on the highway, children quarrelling, and so on; and the candidate is allowed 2½ minutes to write a few sentences commenting on the scene. The screen is then shown blank, and the candidate must describe an imagined picture and comment on it. A matter-of-fact or highly imaginative interpretation, a sensitive, indifferent, or hostile attitude to human relationships, tenderness, harshness, aggression, and cynicism—all these may appear in the responses and suggest the presence or lack of certain qualities in the candidate.

A word association test elicits information of a similar kind. Thirty simple words such as tree, snake, father, station, class are presented successively for 15 seconds and the candidate writes his response in a short sentence or phrase. The associations aroused may be consistently platitudinous, unusual, negativistic, or a well-proportioned mixture. A few clichés and cracker mottoes from potential Civil Servants may not be a bad thing, though they should be leavened by some homely and personal associations; but many bizarre responses might indicate a cast of mind that would be more at home, perhaps, in Parliament or journalism.

Each candidate also writes a short account of himself as though, first, by an appreciative friend, and, secondly, by a discerning critic. Such comments reveal the man with good or poor insight into his mind, the capacity to criticize himself justly or unjustly, the narrow judgment of a prig, the conscience of a pickpocket or a Puritan, the man "assured of certain certainties."

Group Tests

After tea I was allotted to one of the groups to watch their first group test—an informal discussion for twenty minutes on "The Role of the United States in World Affairs." Three assessors test each group—a chairman, an observer, and a psychologist. One of them announces the title of the discussion, but they do not take part in it. We sat around in easy chairs. The sort of qualities revealed in these discussions are ability to discern quickly the point of an argument, to stick to the point, to argue rationally, to develop the discussion rather than jump continually to another aspect of it, to use common sense or academic learning, to summarize quickly, to form an independent judgment, to show an imaginative interest in the topic, and so on. Some candidates make boring speeches instead of discussing; some speak too briefly, some too long; somebody may try to dominate the group, others may submit too easily. The practical man may stick to concrete examples, the academic talk from a book, the impatient interrupt too often, the honest man show his integrity. Some tend always to agree or disagree. (In this discussion nearly all agreed with the others: "I agree with you, but . . ." was a favourite phrase of entry; they were still rather shy and thus tried to shelter in the group.) Some candidates contribute their opinions in the form of questions—"Don't you think that . . ."—rather than affirm their beliefs; some state their beliefs without supporting them rationally; or a candidate may sum up and define without contributing fresh ideas.

This test—so simple in form—is remarkably revealing, and as soon as it is finished the assessors meet to discuss the candidates' performance and allot marks. The qualities that they consider include vigour and clarity of expression, prolixity or conciseness, methodical presentation of facts, practical outlook, sophistication, adaptability, the candidates' convictions, their insight into human problems, whether they are aggressive, adaptable, sensible, alert, whether they encourage the group to collaborate, whether, indeed, they talk sense.

In the evening the candidates are introduced to "Fantasy Island," where the population is mixed, the administration and amenities primitive, and well-meaning philanthropists want to set things right. They study the data and write a short paper on its problems.

The next morning each group holds "committee discussions" on the problems of Fantasy Island, first on the paper previously written, when the chairman is elected by the candidates, and then on short questions set by the assessors, when the candidates take the chair in turn. The chairman is expected to show ability in presenting the problem clearly to the committee, working through the agenda in the time allotted (about 20 minutes), keeping his colleagues to the point, being responsive to their opinions rather than forcing his own on them, and in lucidly summing up the committee's agreed decisions. The other committee members show whether they talk sensibly, persuasively, naively, somnolently, and so on.

In the afternoon each candidate speaks to a small audience for 10 minutes on a subject chosen by the assessors from a list of several that he has previously handed in, twenty minutes being allowed for preparation. He also states the kind of audience he imagines he is addressing, such as a trade union meeting, a university discussion group, a gathering of a women's institute. When candidates are not speaking they are either having private interviews with the psychologist attached to their group or forming part of the audience.

During the day the assessors of all three groups meet and rearrange the candidates into three fresh groups. Each of these "mixed groups" holds a group discussion in the evening of the same day or morning of the third. The subjects are chosen by the assessors and are more abstract than that discussed on the first day; to some extent they vary according to the type of candidates in each group. I watched them discuss "Criteria for Democracy," "The Conflict between Private Conviction and Public Duty," and "Individual and Community." By mixing the groups for these discussions the assessors gain a wider background against which to set the candidates in their original group.

Finally, each candidate ranks on a form his group companions in the order in which he thinks they would be most suitable (1) as a Civil Servant, and (2) as a holiday companion.

The assessors now meet to sum up the candidates in their group. They have already discussed the candidates' abilities and qualities at every stage and all have had private interviews with them. They pay great attention to the candidates' academic and personal testimonials, and have acquired considerable skill in interpreting the usually laudatory phrases of such documents. They take into consideration age, war service or other work, and academic distinction, and relate these to what they have learned of the candidates at the "party." His records will often show whether a candidate is hard-working, enjoys social activity, has wide interests, or flits from one pursuit to another. Does the candidate appreciate the common man's point of view? Is he good-hearted, vigorous, buoyant, impulsive? Can he make contact with an audience, negotiate well? The assessors consider these and many other points and finally allot the marks.

Value of CISSB

Is CISSB a success? The Foreign Office thinks so and requires all its candidates to pass through it. The home Service is more cautious; most of its candidates still enter by examination and final interview. They defend their opinion on the grounds that a certain type of candidate—perhaps the dour Scot or the "prickly" Englishman—might create a very unfavourable impression at the "house party" and its report mislead the Final Selection Board. Only a careful follow-up of the results can tell, and CISSB is carrying this out. So far 150 candidates have been reported on after one year, and a report on every candidate after six months is received. Statistical analyses are also being made to find out what each part of the CISSB procedure contributes to the final result and what features of the candidates' background are most closely correlated with success or failure at the "party."

Apart from the problem of whether CISSB succeeds in discovering those candidates with the qualities required by the Civil Service Commissioners is the much wider one of whether the men and women with these qualities will be contented in the Civil Service. Unless the follow-up investigations are carried out with this distinction in mind they may lead to inaccurate results, for the men may prove to be failures in the Service because their personality, effectiveness, and judgment—correctly discerned by CISSB—are frustrated too often. Sir Percival Waterfield, who found time to visit CISSB while I was there, emphasized that the Service to-day welcomes such men and finds the right work for them. On the other hand I have heard men with some experience of the Service in a humbler capacity dissent from that view, or maintain that it is only the senior men who are able to give full rein to the vigour, enthusiasm, and interest in human affairs that should characterize our administrators.

Most of the candidates consider the tests fair and searching. They seemed to enjoy themselves, so far as any examination can be enjoyed.

REMUNERATION OF GENERAL PRACTITIONERS

ARRANGEMENTS UNDER N.H.S.

The following explanatory notes have been issued by the Ministry of Health for the guidance of practitioners:

The standard of remuneration proposed for general practitioners taking part in the National Health Service is based on recommendations made by a committee under the chairmanship of Sir Will Spens. The Spens Committee was appointed in February, 1945, and was asked to recommend the right standard for remuneration of "a registered medical practitioner in any publicly organized service of general medical practice." The Committee was half medical and half lay, and the findings were accepted and published by the Government in May, 1946. [The Spens Report was printed in full in the *Supplement* of May 18, 1946.]

The original proposal made by the Minister of Health was that remuneration for a general practitioner should take the form of a fixed annual payment of £300 per annum plus a capitation fee of 15s. 2d. (based on 95% of the population using the Service—higher if less than 95% use the Service). But to counter the doctors' fears of this leading to a full-time salaried service the Minister announced in the House of Commons on April 7, 1948, that he was prepared to alter this. [This statement by Mr. Bevan appeared in full in the *Journal* of April 17 at p. 763.] The Minister made the following suggestions:

(*a*) Doctors in established practice may elect either to have capitation fees only or to have the fixed annual payment plus capitation fees at a proportionately lower rate—subject to conditions to be discussed with the profession, to avoid the individual doctor profiting financially at the expense of other doctors.

(*b*) All new entrants to general practice as principals should have the advantage of the assured element of £300 per annum, plus the lower rate of capitation fees, for a period of three years.

(*c*) After three years doctors under (*b*) may choose which method of payment they prefer—i.e., £300 per annum plus a lower rate of capitation fees or a higher rate of capitation fees only.

Doctors under (*a*) are free to change from one system to the other at any time. The fixed annual payment of £300 will normally be subject to the condition that the practitioner shall have not less than 500 patients on his list within two years of his inclusion in the medical list as a principal. Taking the annual payment of £300 plus capitation fees at the lower rate (say 15s. 2d.), here are some examples of what, approximately, a general practitioner would be paid under the National Health Service, apart from any extra fees (see below) he would get:

No. of Patients on List	2,000	2,500	3,000	3,500	4,000
	£	£	£	£	£
Capitation payments	1,516	1,895	2,275	2,654	3,033
Fixed payment	300	300	300	300	300
Expenses (say ⅓)	726 (40%)	878 (40%)	969 (37½%)	1,034 (35%)	1,111 (33⅓%)
Net payment	1,090	1,317	1,606	1,920	2,222

The general practitioner who chooses to be paid wholly by capitation fee would probably earn about the same amount, although generally the fixed annual payment plus the lower capitation fee will be slightly more favourable to the practitioner with the small list and the plain capitation fee to the practitioner with the large list. There are also many possibilities for a doctor to add considerably to his earnings within the general medical and maternity services. Some of the actual figures cannot yet be given, as Regulations have yet to be made, but at present it can be said that the individual doctor's income may be increased in the following ways:

1. Mileage payments.

2. "Inducement" payments. There will be a fund of over £400,000 a year for extra payments to doctors who practise in difficult and unpopular areas.

3. Training of assistants. Grants for supervision will amount to £150 per annum plus the salary of the assistant and boarding expenses (together not exceeding £700 a year) and an allowance not exceeding £150 a year if an additional car is necessary.

4. Fees for obstetric services. Where a doctor provides antenatal care, attendance at the confinement (if necessary), medical supervision of mother and child during the puerperium, and postnatal care—7 guineas. A reduced fee will be paid where the patient changes her doctor or discontinues treatment before the services are complete.

5. Payments in respect of drugs and dressings which a doctor is required to supply on the spot. The rate will be 2s. 6d. per annum (or more in certain areas) for every hundred persons included on his list.

6. Payments for drugs, etc., where the doctor dispenses by arrangement with the Executive Council, either on the basis of the actual drugs and appliances he supplies or at a flat rate per annum in respect of each person on his list, with additional payments for specially expensive items.

7. Doctors providing general medical services or maternity medical services and assistants in the employ of such doctors come within the scope of the Superannuation Scheme set up under the National Health Service Act. A doctor will contribute 6% of his net annual receipts from the Service and the Exchequer will contribute 8% of those receipts. In return, after a qualifying period of five or ten years a doctor will be entitled to a wide range of benefits, including (after five years) a lump sum on death or on retirement after age 60 or on incapacity, and (after ten years) on retirement a pension and lump sum, and on death a death benefit and a widow's pension, the amounts depending on the number of years for which he has contributed.

Miscellaneous Payments

Apart from all these receipts in respect of general medical and maternity medical services, doctors may have income from, for example, the following sources:

1. If the general practitioner is in practice as a principal before the appointed day, he is entitled to get interest at 2½% on the unpaid compensation money.

2. Fee for general practitioner working in clinics of local health authorities. Current fee is £2 5s. a session.

3. Fees for general practitioners on medical boards for Government departments, insurance companies, etc. Current fee

for medical practitioners on Government boards is about £2 12s. 6d. a session.

4. Fees payable by local health authorities under the Midwives Acts where the doctor is called in by a midwife and the obstetric fees mentioned above are not payable.

5. Fees from private patients.

N.H.S. and National Insurance

As much confusion appears to exist between the National Health Service Act and the National Insurance Act, the following explanation may be helpful. There is no need to have any insurance qualification to use any or all of the services within the National Health Service. This means that every man, woman, and child in the country, *without any exception*, whether within the National Insurance Scheme or outside it, is eligible for *all* the health services. There is no age bar, so the new Service is open to old folk just as it is to any other members of the community. About five-sixths of the total cost of the National Health Service will come from taxation in the ordinary way, and only one-sixth comes from the National Insurance Fund. Of an insured man's contribution of 4s. 11d. per week under the National Insurance Scheme, only 8½d. goes towards the cost of the Health Service, and 4s. 2½d. is to cover him for cash benefits—retirement, widows' pensions, unemployment, sickness, and disablement benefit, and so on.

AFTER THE APPOINTED DAY

POSITION OF PATIENTS

The following statement has also been issued by the Ministry of Health as an indication to patients of the changes that will take place on July 5 under the National Health Service as compared with the present position under the National Health Insurance Scheme.

N.H.I.—Only 20 million persons in England and Wales—mainly wage-earners—pay insurance and thereby get the services of a doctor without charge.

N.H.S.—Over 40 million people—i.e., every man, woman, and child in England and Wales—will be entitled to the services of a doctor.

N.H.I.—Compulsory insurance is paid by all manual workers and by non-manual workers earning up to £420 per annum (in a few cases there are exceptions), but doctors' bills must be paid for wives and children of insured persons (unless the wife is an insured person in her own right).

N.H.S.—The new scheme is comprehensive. No one at all need have any more doctors' bills to pay. Moreover, the National Health Service will provide *all* forms of medical advice and care—hospital and specialist as well as a family doctor—and it will not depend upon insurance qualification.

N.H.I.—You are free to choose any doctor able to look after you so long as he takes insured patients.

N.H.S.—Freedom of choice remains for both patient and doctor.

N.H.I.—You may change your doctor, but, unless the first doctor consents, you can only change at the end of March, June, September, or December, and then only if you have given at least one month's notice.

N.H.S.—You may change your doctor whenever you wish, without notice.

N.H.I.—Treatment is personal and confidential.

N.H.S.—It will remain personal and confidential.

Dental and Ophthalmic Services

N.H.I.—Dental service is an "additional benefit" provided by some but not all Approved Societies out of surplus funds. A qualifying period is often necessary. A few societies pay the whole cost, but the majority pay about one-half or two-thirds of the cost. About half the insured population is covered.

N.H.S.—Although you may not be able to get full dental treatment without waiting, owing to a shortage of dentists, all dental treatment provided under the scheme will be free of charge with the exception of treatment or dentures which are more expensive than are clinically necessary and replacements due to carelessness. There will be about 4 million dentists' bills per annum met under the new scheme. There will be no qualifying period. There will be no forms to obtain. Your dentist will have a form, and at the start of treatment all you have to do is sign your name on it. Special arrangements will be made for priority treatment for expectant and nursing mothers and young children.

N.H.I.—The same applies broadly to ophthalmic benefit, which is also an "additional benefit."

N.H.S.—All ophthalmic services will be available to everyone. There will be no "waiting period." About 3 million pairs of spectacles are expected to be issued free of charge each year. There will be a range to choose from, but a charge will be made for special types which are more expensive than the standard types, and for replacements or repairs due to carelessness.

Deaf Aids

N.H.I.—Deaf aids are provided by some Societies which give "additional benefits"; contributions towards the cost of such appliances are made according to the funds available.

N.H.S.—Specialist ear clinics will in time be set up at hospitals. A beginning will be made as soon as possible with the distribution of hearing-aids, and the number will be increased as supplies become available and the Service is developed. Batteries and maintenance will be provided without charge.

N.H.I.—Fees are charged for ambulances by many Local Authorities. Societies sometimes pay travelling expenses incurred in obtaining treatment which is provided as an "additional benefit."

N.H.S.—Local Health Authorities will provide ambulance service without charge.

N.H.I.—Medicines necessary for treatment which are prescribed by doctors are issued free of charge to all insured persons.

N.H.S.—All medicines necessary for your treatment which are prescribed by your doctor will be supplied without any cost or other limit.

Hospitals and Convalescent Homes

N.H.I.—Payments towards the cost of hospital (in-patient) treatment and convalescent home treatment are made by some Societies as an "additional benefit." The cost of specialist services received in hospital may be included in the cost of hospital treatment and paid for by the Society.

N.H.S.—All hospital treatment, including surgical operations and the help of consultants and specialists, will be provided. Your doctor will arrange for you to see the specialist when necessary and also fix your hospital accommodation.

N.H.I.—Medical and surgical appliances are provided by some of the Societies which give "additional benefits"; contributions towards such appliances are made according to the funds available.

N.H.S.—Appliances which are medically necessary will be provided; only in cases where the patient wants a more expensive type will a charge have to be met.

N.H.I.—Payment towards the cost of convalescent home treatment is made by some of the Societies which give "additional benefits."

N.H.S.—Convalescence for hospital patients needing regular care during recovery will be arranged. Facilities will be limited at first. A more general after-care service in the home will be provided by Local Health Authorities.

Other Points

Domestic help is provided in the home by some Local Authorities in cases of illness or maternity. A charge is made according to means. The existing arrangements will be taken over and expanded, the charge continuing to be made according to means.

Health visitors are primarily concerned with the care of mothers and children. Health visitors' work will be extended to cover the health of the entire household, including preservation

of health, precautionary measures, and health education. The health visitors will work in close co-operation with the family doctor.

Many mentally ill or mentally defective people are in workhouses. Others in institutions run by Local Authorities have to pay charges. After July 5 it will be illegal for a mentally ill or mentally defective person to be accommodated in a workhouse. All mental hospitals and institutions (except those run for private profit) will be taken over by the Regional Hospitals Boards, and accommodation and treatment will be free of charge.

Mental and physical health are sharply divided at present. As the National Health Service provides for both the mental and physical well-being of the community, much closer co-ordination will be possible.

LONDON SCHOOL OF HYGIENE AND TROPICAL MEDICINE

ANNUAL MEETING OF BOARD OF GOVERNORS

The annual meeting of the Board of Governors of the London School of Hygiene and Tropical Medicine was held on May 19, when Lord Milverton was elected chairman of the Board in succession to Sir Holburt Waring.

In presenting the annual report Lord Milverton said that this year the report was of a special character intended to celebrate the centenary of public health legislation. About half of it was occupied with a historical review, prepared by a team of students, of the various public health measures from the Public Health Act, 1848, down to the consolidation of social security and medical care by recent legislation. This history had been compiled from contemporary sources (including, as the excerpts showed, the files of the *British Medical Journal*). Lord Milverton also drew attention to an interesting analysis of the subsequent careers of about 500 students of the School who had taken the D.P.H. during the last twenty years. One feature of the analysis was the much larger proportion of students in post-war than in pre-war classes entering academic research and industrial medicine.

Prof. J. M. Mackintosh, the Dean of the School, mentioned various staff changes, including the appointment of Prof. E. T. C. Spooner to the chair of bacteriology and immunology, the conferment of the title of professor of bacteriology as applied to hygiene on Dr. J. C. Cruickshank, and of reader in medical mycology on Dr. J. T. Duncan. Prof. N. Hamilton Fairley had succeeded to the directorship of the department of clinical tropical medicine. Prof. G. S. Wilson had left the School to take up the key appointment of director of the National Laboratory Service, and Sir Philip Manson-Bahr's period of distinguished service to the School, for which he would be long remembered, had come to an end.

Research on Malaria Transmission

The Dean went on to say that the present year marked not only the public health centenary but the jubilee of Ross's discovery. It was appropriate in such a year that the School should have been associated with an important discovery in malaria which Prof. H. E. Shortt and Dr. P. C. C. Garnham had done much to further. This was the attempt to discover the pre-erythrocytic stage of mammalian malaria.[1] The first success was obtained when pre-erythrocytic parasites were discovered in the liver of monkeys suffering from monkey malaria due to *Plasmodium cynomolgi*. The first forms seen were those present on the seventh day of the incubation period and represented developing schizonts of large size found in the parenchymal cells of the liver. Afterwards the earlier and later stages of this development, from the fifth to the tenth day, were also obtained. Following up this discovery, an attempt was made to discover similar forms of human malaria with the assistance of the Malaria Unit of the Ministry of Health at Horton Hospital. The attempt was successful and the pre-erythrocytic stage of *P. vivax* of man was discovered. As expected, this was found to be similar to the form previously found in monkeys. One application of this finding was that in future the action of drugs intended to produce causal prophylaxis could be checked by visual observation of the pre-erythrocytic forms.

At the chairman's invitation Dr. Garnham gave the meeting a brief demonstration, with lantern slides, of this piece of work. For the experiment at Horton a willing volunteer was secured. He was heavily infected with *P. vivax*, and later he was operated upon by Mr. Radley Smith and the material examined by Prof. Shortt and Dr. Garnham. The similarity of the happenings in man to those in the monkey was fully confirmed. It seemed likely that this discovery might lead to new advances in knowledge of the treatment and prophylaxis of malaria and of its immunology.

Continuing his review of the School year, the Dean referred to the gradual resumption of pre-war activities in the department of bacteriology and immunology, where heavy teaching duties had left little time for research; the work on nearly 1,500 mycological specimens received for diagnosis in the subdepartment of medical mycology; the investigation of new mould metabolic products in the department of biochemistry; and other work in the departments of entomology, of applied physiology, and of human nutrition. The department of public health had had an unusually large registration of students for the diploma. During the spring term of 1947, when practical work was being done with medical officers of health, it became necessary to arrange for the distribution of students in six boroughs in London or Greater London in addition to rural work and special visits.

Reference was also made to the acquirement of Winches Farm, St. Albans, as the Field Station of the School. The work on plant helminthology and the workers concerned had been transferred to Rothamsted. At Winches Farm the breeding of laboratory animals on a scale sufficient to supply the wants of the various departments of the School had been begun.

[1] This investigation was the subject of an article in the *British Medical Journal* of Jan. 31, 1948, and a preliminary account of the experiment with a human volunteer appeared in the issue of March 20.

TRAINING IN CHILD CARE

CONFERENCE IN LONDON

A conference organized by the National Society of Children's Nurseries was held at the London County Hall on May 21, when the need for training in child care, teamwork in child health, and administrative problems in training the nursery nurse were discussed. The conference was largely attended by members of local public health departments and voluntary services from all parts of the country.

Alderman Reginald Stamp, chairman of the Health Committee of the L.C.C., said that his Council had been responsible for the development of some very fine residential nurseries, and on the "appointed day" it would inherit the day nurseries at present owned and controlled by the 28 Metropolitan boroughs, with their visiting doctors, nurses, and health visitors. Many nurseries were in improvised and unsuitable accommodation, and his Council was "moving heaven and earth" to obtain additional premises. He saw an opportunity through the new Regional Hospital Boards for developments in nursery work in districts where so far it had hardly gained a footing.

An address on the need for preparation in child care was given by Dr. William Moodie, of University College Hospital. Some people supposed, he said, that with the ordinary girl the play of her maternal emotions would be sufficient to enable her to undertake child care, but that was seldom true. The maternal instinct in a young unmarried girl was immature; she was likely to be attracted to the child as if it were a living doll rather than a person, and even the youngest children were persons. For the natural development of the child it was necessary that he should have emotional security, affection, that is to say, the assurance that he was loved, and some outlet for his energies in the form of work. In his psychiatric clinic he constantly saw children who were emotionally unbalanced because their energies had not been recognized and used, so that the overplus of energy went to the emotional side and ministered to fear and anxiety. Anxiety, after all, was only the state of not knowing about things; once knowledge was imparted, whilst there might be disappointment or vexation, there was no further anxiety. Dr. Moodie spoke also of the need for the child's

nurse to be stable and well adjusted, to maintain an objective attitude, and to refrain from using the nursery as an outlet for an unbalanced or unsatisfied emotion in herself.

Need for Teamwork

The need for teamwork in child health was emphasized by Dr. J. D. Kershaw, M.O.H. for Colchester, who said that it was only during the last forty years or so that there had been a constructive effort in the direction of child health—an effort which took the form not merely of supervision with the aim of preventing disease but of making the most of the capacities with which the child was endowed. For this purpose the family needed some assistance from outside. While the mother might be able to detect some departure from normal health in the child, she was not trained to detect minor but none the less significant deviations. The family needed help in this respect, but the help must not be such as to relieve the family of all responsibility. Three agencies were concerned with child health, the home, the nursery or school, and the medical service, whether of the private doctor or the public health department, and these must work together. He illustrated how effective such co-operation might be in dealing with squint, speech defects, and bad posture. He spoke against a sudden and automatic break between nursery and infant school at the age of 5; the transition should be graduated between 4 and 6. A nursery which was used as a parking place for the child, and nothing else, was breaking up the family.

Dr. Neil R. Beattie, senior medical officer, Ministry of Health, said that, although child care had developed beyond all recognition, yet with all the advances large problems remained, in proof of which it was necessary only to point to juvenile delinquency and the conditions set out in the Curtis report. Many illiterates and semi-illiterates were still to be found, and a great deal of maladjustment in after-life derived from lack of proper child care. He spoke of the adult attitude towards the child and of the need for an enlargement of the conception of care beyond the satisfaction of physical needs and instruction.

Dr. Elizabeth Findlay discussed administrative problems in training the nursery nurse, and there was a useful exchange of constructive opinion and experience on the value of training in child care.

HUMAN FACTORS IN INDUSTRY

BRITISH ASSOCIATION CONFERENCE

The British Association for the Advancement of Science held a conference on "Human Factors in Industry" at the Assembly Hall, Leamington Spa, on May 8. Sir Henry Tizard presided over the first session on working conditions and Sir George Schuster took the chair at the second session on human relations.

Prof. R. E. Lane in his introductory survey said that the contribution of the doctor to industrial health must be, in the first place, on the educational side. The failure of both industry and of municipal undertakings to use the vast amount of information available on human industrial problems was due often to ignorance rather than wilful neglect. There was still not enough co-operation between industry and research organizations. Work undertaken by the Industrial Health Research Board might not have appeared to the practical man to have obvious applications in industry. Research workers should bear this in mind and approach realistically the problems which faced industry.

The doctor was also responsible for seeing that the worker was fit for the job and that the job was fit for the worker. The medical assessment of the workman should have its counterpart in job analysis with a physical and psychological assessment of the needs of the job.

Co-operation was needed between medical scientists and engineers in the design of plant. Other problems which should engage the attention of the doctor in industry were resettlement after illness or accident; casualty services, which must be of a high standard; and certain ancillary services such as ophthalmology and chiropody. The hazards of occupational disease applied to a comparatively small number of men in industry, but the reassurance provided by skilled medical care had an important effect on the morale of other workers. The doctor must win the confidence of employer and employees. He should help to settle the conflicting claims of, say, the industrial psychologist and the production engineer. He needed much knowledge of industry and of industrial processes and a profound knowledge of people.

Coal-mining

Dr. C. L. Cope said that in coal-mining in Britain deaths on the job averaged about 550 per year. Accidents sufficiently severe to cause an absence of more than three days numbered 180,000 per year and had been increasing steadily for a number of years. Certifications of incapacity on account of pneumoconiosis numbered about 4,000 per year and this incapacity was, of course, permanent. Certifications for nystagmus numbered 1,800 per year and for dermatitis 1,600. There were relatively few places where the effective working temperature exceeded 82° F. (27.8° C.), the temperature at which efficiency began demonstrably to deteriorate, but dust and darkness persisted although big efforts were being made to overcome them.

The number of cap lamps in use had risen from 1 per 100 men in 1928 to 34 per 100 in 1946, and the efficiency of these lamps was being steadily improved. Fluorescent lighting had now been installed not only in haulage ways but also at the coal-face in several collieries. It had not yet been possible to assess the effect of different methods of lighting on the incidence of nystagmus and on accident rates. Attempts were now being made to introduce a uniform method of recording accidents in collieries throughout the country.

Increasing mechanization had tended to increase the amount of dust in the mines, but this was now being reduced by spraying with water or with water and wetting agents or with foam. In one colliery in South Wales effective dust suppression by spray and infusion was started in 1942. Dr. Jenkins in a survey of several hundred miners was able to collect two small groups; one group had worked in the pit in the pre-1942 dusty days for up to five years and the other group had only worked there in the relatively dust-free period. Of the former group of 18 men, 17 showed Grade I or Grade II lung changes; of the latter group of 22 men, after up to five years' exposure, none showed any radiological changes. Dr. Cope concluded by saying that improved environmental conditions would bring better physical health, but the medical profession was now more aware of the importance of mental health and of the way in which this was influenced by the human rather than the physical environment.

Heating and Ventilation

Dr. T. Bedford, who contributed the last paper in this session, discussed some of the problems of heating and ventilation. Recent work suggested that as a general rule fresh air should be supplied at the rate of not less than about 600 cubic feet per person per hour, and that preferably there should be 1,000 cubic feet per person per hour. The Factory Department pamphlet on the ventilation of factories recommended a ventilation rate of six air changes per hour. In most instances this represented good ventilation, and if such a rate could be maintained it would probably provide a reasonably clean atmosphere from the standpoint of bacterial contamination.

For persons doing very light work the air temperature during the winter months should be as nearly as possible 65° F. (18.3° C.). It was undesirable that it should fall below 60° F. (15.6° C.) or exceed 68° F. (20° C.). The 1937 Factories Act required that in rooms where a substantial portion of the work was done sitting and did not involve serious physical effort the temperature must not be below 60° F. (15.6° C.) after the first hour of work. For more active work somewhat lower ranges of temperature were sufficient. For active yet light work a temperature of 60° to 65° F. (15.6–18.3° C.) was suitable, while for work requiring more muscular exertion a temperature of between 55° and 60° F. (12.8–15.6° C.) was desirable.

Even at ordinary room temperatures a high atmospheric humidity tended to cause feelings of stuffiness. At such temperatures the moisture content of the air should not exceed 70% of the saturation value, and should preferably be well below that figure. In the average factory where there were no wet processes the humidity would generally be satisfactory if the fresh air supply was adequate. Discomfort was felt when the wet-bulb temperature exceeded 70° F.

When a task required considerable manual dexterity uncomfortably low temperatures were undesirable, for as the hands became chilled their dexterity diminished. In one series of experiments the investigators imitated an industrial process by assembling the links of a bicycle chain. When the room temperature was 50° F. (10° C.) the time required to perform the test was 12% longer than when the temperature was 62° F. (16.7° C.). In another series of laboratory experiments the effect of temperature on the work done by a group of men while weight-lifting was studied. The men worked at their own discretion and were paid a bonus on the amount of work done. At a temperature of 75° F. (23.9° C.) they did 15% less work than at 68° F. (20° C.). Other observations had shown that when work was done at a constant rate an increasing strain was imposed on the body as the temperature of the environment rose.

Dr. Bedford also discussed the effect of temperature on accidents, particularly in coal-mining, and on industrial sickness. Steel smelters had a sickness rate 23% greater than that for the whole body of workers, and the rate for puddlers was 20% greater. Tinplate-mill men and rolling-mill men had sickness rates 18 and 8% above the average. He concluded by saying that the ventilation and heating of a factory should be under the effective supervision of one person who had been trained to pay special attention to the proper use of the appliances and arrangements provided. Particular care should be taken to ensure that the temperature was suitable for the work which had to be done, and that overheating was avoided. Unduly low temperatures at the beginning of the day and excessive warmth later were still too often observed. These troubles could be avoided by adequate supervision.

Human Relations

In the second session the introductory survey was given by Dr. T. G. Tredgold, and he was followed by Mr. D. Chapman, who discussed incentives.

Mr. Chapman pointed to a number of factors which suggested that the national morale had declined over the last thirty years. He thought that tackling production problems by exhortation on a national scale had had little or no effect, and might even have had a bad effect. In the final solution financial incentives would play an important part, but their effectiveness would depend on the total situation. Good management, intelligent and sympathetic foremen and departmental managers, democratic participation of workers in management, and effective but not paternal welfare schemes were all as important in their way as satisfactory lighting, heating, and sanitation.

The problem of deterrents was considered by Dr. A. T. M. Wilson. Among other things Dr. Wilson said: "It is an almost universal feature of industrial concerns that reciprocal scapegoating systems have been developed and that they are often heavily sanctioned on what is alleged to be a basis of experience. It may be wise to remark in passing that such systems are not confined to the industrial world but are a universal human phenomenon." He had found that pep talks worked in the opposite direction to that in which they were intended. Autocratic practice—and the expectation of it—was so deeply entrenched in industry that any attempt to change towards a more co-operative state of affairs was likely to be met with considerable scepticism, which must be accepted and understood. In disposing of conditions acting as barriers to co-operation in industry a start could be made almost anywhere and by anyone, provided that those who sought to make changes were men of integrity and sincerity of purpose. Not enough was known in the scientific sense about industrial problems of this kind, and this he regarded as a justification for active research and not for inactivity. But there was a danger that the scientific method might be discredited in human affairs, and particularly in industrial problems, because it was too often inadequately applied.

The Central Council for Health Education has completed arrangements for its annual summer school in health education at "High Leigh," Hoddesdon, Herts, from Aug. 11 to 25 (*Journal*, Jan. 10, p. 83). A few places are not yet taken, and information may be obtained from the Medical Adviser and Secretary, Central Council for Health Education, Tavistock House, Tavistock Square, London, W.C.1. The inclusive cost of the course per person is 16 guineas.

Reports of Societies

RADICAL EXCISION IN CARCINOMA OF RECTUM

In the Section of Proctology of the Royal Society of Medicine on March 19, with Mr. DICKSON WRIGHT in the chair, the subject for discussion was radical excision of carcinoma of the rectum, with conservation of the sphincters.

Prof. G. GREY TURNER referred to the operation which the older generation associated with the name of Prof. Hartmann. A section of the bowel was removed as thoroughly as in any other operation, but the mucous membrane at the lowest part of the rectum was denuded from its sheath and the bowel drawn through the sphincters and sutured to the anal margin. He could not forget seeing in 1931 the demonstration by Hartmann of this operation and the care and thoroughness with which he carried it out. He had had the opportunity of examining one or two cases in which the operation had been done two or three weeks previously and was able to observe the perfection of the sphincter apparatus. He gave statistics of a group of 17 cases, in 14 of which there was a malignant condition; 6 had died with recurrence or dissemination within three years, but 7 were alive and well more than five years after operation.

The operation was very satisfactory in dealing with frankly non-malignant conditions, for example papillomata. The length of bowel removed depended to a certain extent on the size and type of growth. It was necessary to pull down the upper end so that an anastomosis could be made without tension. This was not an easy manœuvre, it took a long time, and the surgeon must satisfy himself that enough bowel had been excised. One point to be considered was stenosis. Where there was stenosis one could dilate with the finger or an instrument, and then instruct the patients to give up what they took to make the stool fluid. The stool then, being solid or semi-solid, acted as a natural dilator. None of his patients had had a permanent stricture; most of them had as good control as before operation. Prof. Grey Turner added that he was not fond of methods of irrigation, but he could not forget the wonderful results which Gordon-Watson brought before the Section some years ago. There might be other methods of using irrigation which could be combined with an operation of a radical nature. Some people were very satisfied with colostomy, but he thought that patients dreaded it, and also that it was regarded with misgiving generally by surgeons.

Technique and Results

Prof. C. A. PANNETT said that for many years in this country and in America the surgery of carcinoma of the rectum had been dominated by the personality of the late Ernest Miles. Everybody recognized the great work he did and the correctness of his observations; where he went wrong, or where others who followed him went wrong, was in the deductions from those observations. It was true that with patients dying of carcinoma of the rectum the growth spread outwards and downwards, but in the operable case, when the disease was at a stage at which the growth could be removed and a conservative operation done, this was not likely to be the method of spread, which might be upwards only. Prof. Pannett then proceeded to deal in detail with various points of surgical technique. He seldom did a colostomy before operation. There were cases where the growth was too low to be dealt with from above, and then he thought it right to do the combined operation which he had described in 1934, but the longer he went on the more patients he found who were capable of being treated by the one operation alone. In conserving the sphincters a great amount of the work of the operation was eliminated, and if it could be done from the abdomen the patient was less shocked. Prof. Pannett concluded by saying that he had lived to see the hollowness of cherished surgical beliefs demonstrated and to feel that scientific advances could be made only if they regarded their contemporary beliefs as always wrong or at best as half-truths; but when he considered patients who had undergone this operation and had lived twelve or fifteen years of perfectly normal life he could not help feeling that the foundations of this operation could be placed among the dependable half-truths.

Mr. O. V. LLOYD-DAVIES said that it had always been one of the aims of the surgeon to remove growths without the necessity for permanent colostomy. Some in the past had relied upon caecostomy, since it was realized that increased gas tension might be the determining factor in success or failure. Few considered the advisability of transverse colostomy, which was a distinct advance towards safety. With regard to the combined excision operation as performed by Ernest Miles, figures from many clinics suggested that 50% of five-year cures was about the best which could be attained, and only early diagnosis would improve such results. Mr. Lloyd-Davies showed specimens of cases where wide removal had been done, but in spite of this there had been recurrence two or three years later. He entered into details of the three types of operation which were performed at St Mark's, and concluded by saying that a high local recurrence rate was too big a price to pay for the avoidance of a permanent colostomy. These patients must be followed up for the rest of their lives.

The discussion was continued by Mr. NAUNTON MORGAN and Mr. W. B. GABRIEL. Mr. J. P. LOCKHART-MUMMERY said that when he started on this line of work the chief consideration was mortality, which at that time at St. Mark's and anywhere else was about 85 or 90%. By using the Hartmann operation the mortality was reduced to more reasonable proportions. Next came the question of recurrences; a careful selection of cases and the combined operation had reduced the recurrence rate quite considerably, so that to-day a patient who had to face an operation for carcinoma of the rectum had a very good chance not only of surviving but of having no recurrences. The new problem was whether as good results could be obtained by an operation which did not involve a permanent colostomy. This had not yet been achieved, but it would be done, and the only way to tackle it was the way in which Mr. Lloyd-Davies and Mr. Morgan were tackling it, namely, by scientific methods and very careful examination of their procedure and their specimens.

MILLION-VOLT THERAPY AT ST. BARTHOLOMEW'S

Analysis of Results

A report on the million-volt therapy installation at St. Bartholomew's Hospital was given at a meeting of the Section of Radiology of the Royal Society of Medicine on May 21, with Dr. J. S. FULTON presiding.

Mr. G. S. INNES, physicist in charge of the installation, said that the experiment at St. Bartholomew's began in 1936 with an installation for 600,000 volts, which operated successfully initially at 700 kV, and later, in 1939, this was stepped up to one million volts. He described and illustrated the various details of the equipment. Among other matters he mentioned that the tube was about 30 ft. long and weighed 12 tons, and, inasmuch as it was impossible to adjust the tube to the patient, the floor was made movable up and down, and the movements were nearly as simple as those of a normal free-moving *x*-ray tube. The installation had operated almost non-stop since 1939, with only one major shut-down of one afternoon, though occasionally it was stopped for an hour and a half while a rectifier filament was changed. During the war, although the department lost its ceilings, windows, and doors, and on one occasion part of its roof, the plant was never out of action. In the clinical experiment which was undertaken it was realized that the applicators would become too heavy at a million volts, and therefore a diaphragm system was installed, giving some 450 different field sizes.

The main physical advantage gained by the installation was the increased depth dose, particularly with small fields. He gave a comparison of the transmission through various substances as between the million-volt installation and the 200 kV. In thick bone, such as the shaft or head of the femur, with 200 kV there was 86% transmission (compared with water), whereas with the million-volt installation the transmission was 95%. The installation also allowed the use of large doses without damaging the skin. Again, with unilateral lesions, often it was not necessary to irradiate the other side of the patient. Mr. Innes concluded by expressing his great indebtedness to the eight medical officers with whom he had worked, for the understanding they had shown of the physical problems encountered in such an experiment.

Reactions

Dr. ARTHUR JONES gave a brief account of the effect of these radiations on the patient and of the relatively few unfavourable reactions which had been met with in the use of the plant for the treatment of malignant disease. A voluminous literature had been accumulated on the variation of skin response to *x*-ray treatment. The skin dose, fractionated over 3–5 weeks, for a second-degree erythema lay between 4,000 and 5,000 r. Erythema developed more slowly than with 200 kV, and reached its maximum later. In the deep-therapy range the factor limiting the radical treatment was often the severity of the skin reaction. But the million-volt therapy might produce a "treatment-limiting" mucosal reaction in the vicinity of the tumour. This was observed particularly in the pharynx and larynx and in the pelvis. In the pelvis these mucosal reactions might affect bladder, rectum, and vagina. As for general reactions, radiation sickness did occur in patients having super-voltage therapy, but was probably less frequent than at 200 kV. In the *Year-Book of Radiology* in 1937 the editor observed that presumably the operators of the then projected million-volt plant would familiarize themselves with the not always happy effects of supervoltage therapy which had been recorded in America. This had been done, but relatively few severe injuries had occurred at Bart's, and this was a tribute to the careful planning of the treatment of each individual case by Mr. Ralph Phillips and Mr. Innes. Skin reactions had often left a mild chronic radiodermatitis as a sequel. Skin atrophy was less common than with the 200-kV therapy, but fibrosis and oedema giving a leathery skin were not infrequently encountered. Subcutaneous fibrosis affecting fatty tissue was also more common. A true radio-necrosis was of rare occurrence, but the incidence of necrosis after irradiation of anal canal tumours was unfortunately high, developing in 5 patients out of a total of 23. Muscle fibrosis occurred in the neck in 3 out of 15 cases treated for thyroid carcinoma. Irradiation of the oesophagus for carcinoma had resulted in rather dramatic sequelae in two cases. One of these was in a man aged 57 who was given a tumour dose of 5,200 r in 35 days by six fields for carcinoma of the middle third of the oesophagus. The clinical response was good, but two months later he died of a sudden haemorrhage. The oesophagus and the aorta were found to have communicated through a large hole; there was no sign of growth nor any evidence of necrosis above or below the perforation. Here again he felt that they were dealing not so much with a true necrosis as with a failure of the reparative processes. The other case was somewhat similar. Possibly with some different method of fractionating the dose such a disaster might be avoided in the future. A most unusual case of fatal hepatic disorder occurred during irradiation for bronchial carcinoma. The patient was given 4,500 r in 25 days. It appeared subsequently that during the irradiation he was incubating chicken-pox. Post-mortem examination revealed gross abnormality of the liver.

Results of Treatment

Mr. I. G. WILLIAMS gave an analysis of the results of treatment. Five main types had been chosen for analysis: carcinoma of the breast, inoperable, but without distant metastases; carcinoma of the cervix in all stages; carcinoma of the upper air passages; inoperable carcinoma of the rectum; and carcinoma of the oesophagus. Research had been handicapped by the war; on humanitarian grounds it had been necessary to treat patients other than those in these classes. It had been the policy at St. Bartholomew's to treat early malignant cases by surgical rather than by radiotherapeutic methods; thus the patients who were referred for million-volt therapy were incurable by any other means because of the nature of the tumour, its anatomical extent, or the general condition of the patient. Less than 5% fell into a really operable category. Their experience emphasized clearly that early disease could be cured and that late disease could not be cured, though considerable palliation could be offered.

The number of cases available for analysis was 726. A few of the patients were untraced, and these were counted as dead, and therefore to that extent the figures were weighted against the therapy. Mr. Williams said that in cancer of the breast he could confirm Phillips's observation that disappearance of the primary tumour and the regional lymphatic metastases was

more certainly and easily obtainable with supervoltage than with ordinary deep *x*-ray therapy. Of 14 patients with advanced carcinoma of the tongue all were dead : 9 died in the first year, 3 in the second, one in the third, and one in the fourth. In 6 cases the primary growth regressed before the patient died from metastases. Between 1939 and 1945, 20 cases of carcinoma of the antrum were treated, 13 of them primarily by irradiation. Of these 13, 4 were alive—one in the eighth year, one in the fifth, and two between the third and fourth. The average dose given in these cases was 4,500 r in 21 days. There were 34 cases of extrinsic growth of the larynx ; 2 were moribund on admission. Of the 32, 3 had survived—two of them for five years or over, and the third was about to reach the fifth year. Of 20 cases of intrinsic carcinoma of the larynx treated primarily by irradiation, 10 were alive—4 at five years, 4 at four years, and 2 at three years. Of the 10 who were dead, 5 died of the disease, 2 of other causes, and 3 of damage due to treatment.

Carcinoma of the bronchus was treated in 148 cases, in 46 of which the treatment was palliative ; of the remaining 102, 100 were dead, and 2 alive, having survived five years and four years respectively. The problem here was not entirely one of dosage, for the cases treated with high dosage had done no better than those treated with low dosage. The relief of symptoms, however, was very real.

Of 40 patients with carcinoma of the bladder, 5 died within three weeks ; of the remaining 35, 8 were alive and 27 dead. In only one case was the bladder severely damaged by the treatment. Of 23 cases of squamous-celled carcinoma of the anal canal, 5 had a serious radiation necrosis, which was probably responsible for the death of one patient. Out of 11 of these patients who were treated five years ago 3 were alive and well. One patient died in his fifth year without any symptom referable to the anal canal ; two of the survivors had strictures, both necessitating colostomy. The number of cases treated for carcinoma of the rectum was 192, and the total number of survivors was 20. In 42% there was relief of the symptoms which were due to the primary growth, and 60% of the patients were quite comfortable until they died of metastases. Of 16 patients with cancer of the thyroid, 4 survived for periods of eight, seven, five, and four years, respectively.

In comparing the results with those obtained by the use of 200-kV therapy, there appeared to be no very marked differences. Tumours which responded poorly to ordinary radiation treatment showed little difference in their response to million-volt therapy, with the possible exceptions of cancer of the bladder, rectum, antrum, and larynx. There was no doubt that every radiotherapeutic department should have a high-voltage machine to increase its range of usefulness. With such equipment more could be done for some of the cases, and the application was made more easy for the patients and also for the technicians and physicists. It was disappointing that the results were not better, but that was the tale they had to tell.

Higher Voltages

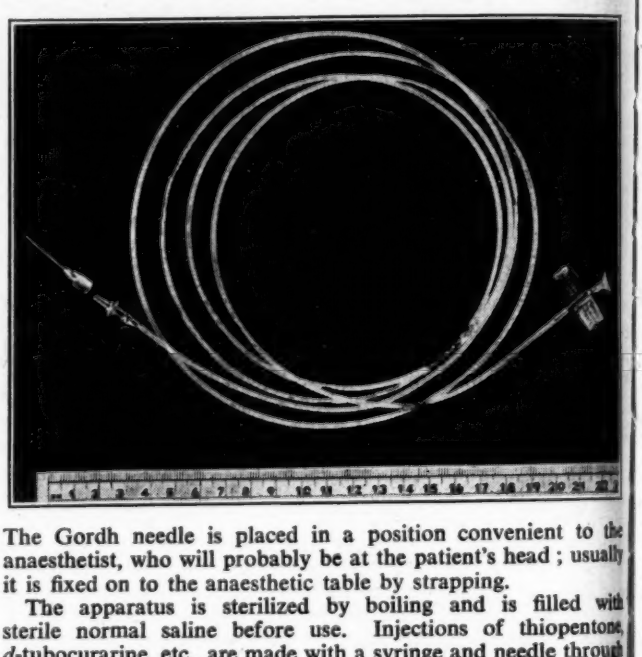
Dr. N. S. FINZI recalled that in his Mackenzie Davidson Lecture to the British Institute of Radiology some fifteen years ago he had suggested a test of the higher voltages, and this was made possible at St. Bartholomew's through the generous Sassoon benefaction when in 1936 the department was started for the treatment of patients at 600 kV, and in 1939 was keyed up to a million volts. It was realized from the beginning that no staggering improvement was to be expected. The research was planned to comprise certain definite groups of cases, but unfortunately the war interfered with the programme. The figures were too small to be significant, though they were probably significant for the breast, the antrum, the larynx, and possibly the rectum. The occurrence of necrosis was mostly in the early cases and when large fields were being used. Later, with very small fields, carefully checked by isodose charts, these troubles were reduced. With million-volt therapy these results could be obtained with less damage to normal tissues. Apart from improvement in results, those who worked with this apparatus preferred it to lower-voltage installations on account of ease of manipulation and the greater accuracy obtainable. In certain respects enough had been achieved to justify the hope that better results would be forthcoming, and with further increases in voltage there might be better results still. There was some difference of opinion on whether a big jump in voltage should be taken or intermediate stages should be tried. He himself was not in favour of the big jump ; the optimum levels might in that way be missed. He thought they should aim at a plant giving from three to five million volts, and afterwards, if it was considered desirable, go up to twenty million. The results obtained with one million volts seemed to indicate that malignant disease should be treated with higher voltages still.

Mr. F. C. W. CAPPS, speaking as a surgeon at St. Bartholomew's, said that in carrying out laryngectomy he had preferred pre-operative irradiation. He knew that some preferred radiotherapy to be done post-operatively, but he had never regretted arranging it the other way, and he had always found that it made the growth more manageable from the surgical point of view. Dr. T. ANTHONY GREEN, Prof. B. W. WINDEYER, and the President added some further remarks, mostly congratulating those concerned in the Bart's experiment.

Preparations and Appliances

AN EXTENSION FOR THE GORDH NEEDLE

Dr. C. F. SCURR, Registrar in Anaesthetics, Westminster Hospital, writes: The apparatus illustrated is intended to facilitate the intravenous administration of anaesthetic drugs during operations in which a vein is not readily accessible to the anaesthetist—e.g., thyroidectomy, radical mastectomy, and operations in the lateral position. On the left is shown an ordinary intravenous needle which is introduced into the chosen vein ; this needle is then connected, by means of the nozzle shown, to six feet of the finest "polythene" tubing, at the other end of which is fitted a standard Gordh diaphragm needle.



The Gordh needle is placed in a position convenient to the anaesthetist, who will probably be at the patient's head ; usually it is fixed on to the anaesthetic table by strapping.

The apparatus is sterilized by boiling and is filled with sterile normal saline before use. Injections of thiopentone, *d*-tubocurarine, etc., are made with a syringe and needle through the diaphragm in the usual way. If a brand of *d*-tubocurarine is used which is not compatible with a barbiturate, the apparatus is washed through with 2 ml. of sterile saline in between the injections of the drugs ; a similar procedure is used to drive through injections of small volumes. As the capacity of the whole apparatus is only 1 ml. the lag is negligible : the resistance to injection is of a similar order to that encountered when making an ordinary intravenous injection. As there is no "backlash" in the system, blood does not enter the intravenous needle and clotting does not occur. In trials on numerous occasions and in very prolonged operations blocking of the needle has not been encountered.

The "polythene" tubing was supplied by Portland Plastics, Ltd. The complete apparatus can be obtained from Medical and Industrial Equipment, Ltd.

Correspondence

Domestic Difficulties in the N.H.S.

SIR,—I have a small house with only two sitting-rooms and a hall on the ground floor. It is the only house that I could buy when I returned to practice after the war. The hall is the waiting-room, and for my surgery I use the best sitting-room. My family are restricted to the second lounge and a parlour for meals. It has not been comfortable, but we have managed, although frequently there has been standing room only in the hall. A living-in maid is unobtainable, and the half-day domestic help has not as yet been too difficult about the mud brought in on the patients' shoes. My wife holds the fort while I am out and spends her few moments of leisure in answering the telephone and inquiries at the door, many of which are unnecessary and very irritating.

It is conditions such as these that make many doctors dread the N.H.S. Act. Housing and domestic difficulties will make life intolerable when, to make a living wage, one will have to encourage mass-production medicine.

I would ask our negotiators to urge the Ministry to authorize Local Executive Councils to set up *at once* National Health Service surgeries conveniently spaced on main bus routes. Such surgeries should not in any way be considered as health centres, which will evolve later, we hope, on an experimental basis. Any ordinary dwelling house will suffice, subdivided into a waiting-room and consulting-rooms, with secretary receptionists, capable of typewriting hospital letters, certificates, reports, etc., two nurses to chaperon women patients and assist in minor operations, and telephonists.

By staggering hours of consultation a number of doctors could be accommodated, and the only equipment required would be a sterilizer, the necessary furniture, and filing cabinets for record cards. Doctors would bring their own instruments and voluntary aid societies would no doubt help to improve the atmosphere by dispensing tea and light literature in the waiting hall. Combined surgeries of this kind would provide more comfort for the patients than I can supply and would be an even greater help to young doctors, who could then live in a hotel or flat until a convenient house was available. The relief and joy of our wives would rejuvenate them and we would all start the N.H.S. in a happier frame of mind.—I am, etc.,

Leigh-on-Sea. H. W. TOMS.

Questions of the Hour

SIR,—I have refrained from writing to the *B.M.J.* as there is an intense desire among many members to publish their opinions. However, now that the B.M.A. has decided to yield to the Minister without a fight for our rights, I would like to make the following observations.

I agree it was about time that something was done to rationalize or regularize the P.M.S. and the National Deposit on lines similar to the N.H.I. I also agree that the Spens Report was a fair judgment in so far as the N.H.I. remuneration was concerned. However, we are being paid according to the Spens Report on the basic value of the £1 in 1939 and not 1948. The B.M.A. has made no provision in its stand about protecting our remuneration and the terms of service demanded, but rather has left it to a gentleman's agreement. After the Minister has got his Service going he can reduce the remuneration to 15d. and we can do nothing about it.

Furthermore, I should like to know where I stand about my property before I decide to join the Service. If I continue my practice at my home (which is incidentally specially designed in the best of B.M.A. tradition for the purpose), and should I decide at some future date to resign, have I to get permission from the Minister or his committee before selling my home? If, on the other hand, I decide to rent a shop in the neighbourhood and cease to practise in my home (which, of course, would reduce the facilities or ease for my patients being able to get me), is the sale of my house still subject to the Minister's control? If so, is any other property that I may possess subject to the Minister's control?—I am, etc.,

Enfield, Middlesex. LEON CHALMERS.

Simplify the Work

SIR,—Now that it seems probable that the profession will attempt to work this pernicious and ill-considered Health Act, I suggest that our negotiators should insist on making working conditions as easy and simple as possible; otherwise the administrative side is bound to become chaotic.

From the point of view of the G.P. who cannot afford a secretary one or two things are essential. First, they must be allowed a rubber stamp for signatures, then certification must be reduced to a minimum. This craze for separate certificates which all employers demand must be done away with. There is no earthly reason why the statutory certificate cannot be shown to the employer and noted in his files without a separate piece of paper being issued.

The design of clinical record cards should be made or approved by our negotiators. The card should contain a printed list of (*a*) subjective symptoms, e.g., pain (location), sleep, appetite, cough, bowels, etc.; (*b*) objective symptoms, e.g., colour, T. and P.R., fauces, tongue, heart, lungs, other organs. These lists should be printed in the first column of the card, the second and subsequent columns to be used for notes on symptoms, under the date. The N.H.I. record cards entailed too much writing.—I am, etc.,

Stone, Staffs. R. MURRAY BARROW.

Division in Profession

SIR,—As probably a last act as Chairman of the Shropshire and Radnorshire Medical Independence Association, I write to protest against your ill-conceived editorial in the issue of May 15, which attempts to see even partial victory for our cause as a result of the recent activities of the B.M.A. Council or wisdom in its rushed and badly timed April plebiscite.

Outmanœuvred, outwitted, and stampeded, the Council rushed that plebiscite upon us without our having sufficient time to consider and discuss the full implications of the Minister's tardy modifications to certain details of the Act which we could not accept. There is no doubt there should have been insistence on a postponement of the appointed day to permit of this. But this was not done; and, as a result, in many areas the profession either voted as stampeded, isolated individuals or refrained from voicing their opposition, which had already been so strongly expressed in the February plebiscite. The result is a debacle.

The Representative Body meets, therefore, on May 28 in circumstances which no effort can avail to restore the shattered unity of the profession. We are now in a situation the reverse of democratic in which the majority feel we are being forced to operate an Act by the blind and injudicious votes of a minority and an *ipse dixit* of the Council. Every important and vital matter affecting the future of ourselves and our profession is still outstanding and unsettled. There is despair that they will ever be settled in any satisfactory way. Our boats have been burned before our eyes.

Truly, the Representative Body meets in tragic circumstances. We in the provinces have lost faith in our central organization as a negotiating body, and, unless the Representative Body by determined action can to some extent retrieve the situation by insisting on a strength in negotiating hitherto sadly lacking, the B.M.A. as a medium of implementing the will of the profession will meet the fate its great failure has deservedly brought upon it.—I am, etc.,

Shrewsbury. W. J. GRANT.

Bewilderment

SIR,—May I endeavour to express my complete agreement with Dr. J. McIntosh Rattray's letter (May 15, p. 951) and my bewilderment that so wise and courageous a colleague as Dr. Alfred Cox should advise capitulation (p. 949) on matters of principle?

The leading articles are so brilliantly written that they naturally exercise great influence on the profession, and in the issue of May 15 (p. 936) it is stated that the Minister has offered a compromise, and that compromises are the traditional English way of settling disputes. For the medical profession to reject the compromise and to be intransigent would cost the support of public opinion.

The profession compromised (and in my settled opinion committed a fundamental error) when the Representative Body affirmed its desire for a comprehensive service available to everyone, instead of a comprehensive service available to those who needed it. After exhaustive discussion, certain fundamental principles were accepted as essential if there was to be any freedom for the public or the profession. I suggest, Sir, that you are confusing compromise with surrender.

I would like to ask Dr. Cox if he does not think it an extraordinary fact that in spite of the change in lead in the *Journal*, in spite of the persistent State propaganda of the *Lancet*, in spite of the absence of support from any political party and the nauseating exhortation in the House of Lords by Lord Moran, so many of his colleagues are still convinced that to implement the present Act would be a disaster for Medicine and for the happiness of this country.—I am, etc.,

Bournemouth. E. D. GRANGER.

Comprehensive Service

SIR,—I have read with much pleasure Mr. David Hardie's letter (May 8, p. 898). To my mind he sums up the matter very clearly. Some form of comprehensive medical service I believe most doctors desire, but the crux of the whole matter, as Mr. Hardie states, is that this service, while being open to everyone, should still be one to which everyone is free to subscribe or not; in other words, it should be one which preserves entire both the freedom of the patient and the freedom of the doctor.—I am, etc.,

London, S.W.3. BASIL BROWNING.

Extend N.H.I.

SIR,—I wish to express my utter dismay at the puerile and inefficient attempts of the B.M.A. to resist the enslavement of the medical profession. With a display of bravado we, the general practitioners, who are the backbone of any medical service, were assured that the B.M.A. would, on our behalf, fight. What a fight! Unlike that great strategist Montgomery it would appear that the B.M.A. have a new technique—i.e., fight without weapons even though they be there for the handling.

At a meeting in Leicester Dr. Guy Dain informed us that the armoury was well stocked and all doctors would soon receive printed propaganda for distribution to their patients informing them of the views of the profession. We are still waiting. At this date only a minority of the public is informed on important details of the scheme, such as the fact that only 10d. of the forced levy per week is to be utilized for the medical services. With a little intelligent co-operation between the medical profession and the general public a powerful weapon could have been forged which would have ensured a successful new health scheme. The B.M.A. has failed completely in any attempt to bring the views of the medical profession to the forefront for examination by the general public.

All that is necessary for a new scheme to be acceptable to public and doctors alike is to include dependants of insured persons in a comprehensive scheme so that the working man would have the right to call in a doctor to his wife and family in a time of need without worry of bills to follow. Such a scheme would be acceptable to the profession and would necessitate no new officials or such a sweeping clearance of methods which have withstood the test of time. The scheme in its present form is a mass of inconsistencies and leaves the general practitioner with a sense of utter frustration.

Such matters as the supply of house and surgery for the use of an incoming practitioner to a new practice are apparently beneath the dignity of a Minister of Housing to consider, but when any change of practice is attempted this must cause complete confusion, since a practitioner may not sell his house to another without risk of prosecution for selling goodwill as well as bricks and mortar. With regard to goodwill, under the present N.H.I. scheme a doctor takes his salary from the State, but he still owns the goodwill of his practice—to whose detriment, may I ask? Do two wrongs make a right? If it is wrong for medical men to sell goodwill, how does it become right for Mr. Bevan to buy goodwill, lock, stock, and barrel?

Even at this late hour I am convinced that, if the B.M.A. were to publish in an understandable form the conditions under which doctors are being blackmailed into a service which the majority thoroughly dislike, then the public would have an opportunity of assessing the value of the services they are likely to obtain from a dissatisfied profession. It is the people who are being called upon to pay for this new service, and they have the right to know how their money is being spent. How many consultations or bottles of medicine will the public receive for the sixty-odd million pounds that Mr. Bevan proposes to spend on buying the goodwill of doctors' practices? If there is all this money available to spend would it not be possible to put it to better use than merely using it as a lever by a political party to keep doctors in their place—i.e., as employees of the State with no right to criticize their employers except at risk of dismissal?—I am, etc.,

Kibworth, Leicester. RAYMOND F. SIMKIN.

National Health Service

SIR,—Two years ago the then Editor of the *Journal* refused a letter from me on the new Health Act as being likely to offend or prejudice. I made three points then—namely, (1) that the Minister of Health would not negotiate in the ordinary way expected of him, that he was determined to get his way, and on this account we should be prepared for a lengthy battle; (2) that we should use all and every method, even to strike (our idea of striking), to prevent the Minister getting away with it; (3) that from the highest officials and chiefs of Headquarters to the humblest practitioner we should try to get a promise of "no surrender" until we had a fair and square deal.

After two years of fruitless negotiations this letter of 1946 does not seem offensive to-day. I am appalled and grieved at the way the "sponge has been thrown in" in these last few weeks. Examining the position coolly and impartially, I was proud of the stand the B.M.A. and ourselves were making up to the first plebiscite. Democratically we were informed of the situation and asked to vote "yes" or "no" on three or four important issues. We had them all before us—"no whole-time service," "right to buy and sell practices," "right of appeal," etc. The majority answered "No" to the lot, not to one vital principle alone. As was to be expected, this was too much for Mr. Bevan and the Government, who had the wind up so badly as to stage a debate on an already passed Act, a most unusual and rare parliamentary procedure, and, true to form, the Minister's utterances were given full play. This debate, of course, had no object but to frighten us and affect the plebiscite. It failed to do either.

Now armed with the results, the B.M.A. Negotiating Committee had all the strength and weapons it wanted, and the Minister knew this well. Airily, in response to an arranged question, he told Parliament of his good will, and as some doctors did not agree to accept the Act as it was, if it was only a matter of not making us Civil Servants (as he had always promised not to), and if an Act of Parliament was a little more reliable than his word, he was willing to introduce it.

Next comes what to me staggers the intellect, that because of the crumb thrown by the Minister we are by the "considered" judgment of the Council asked to vote again. Why? Hadn't the Council already got their mandate? Did the fact that Mr. Bevan gave in in one particular answer for the other unsolved questions? Then consider the way this plebiscite was carried out. Voting papers were quickly sent out. A few days only were given to consider the questions. No information like the first plebiscite, but a slight innuendo that things were better and that we might now change our minds with honour if not with impunity. Thousands of men like myself did not vote, could see no reason in voting, and it did not require prophetic sense to see what the results would be.

The long and the short of it is that the second plebiscite, whether meant to or not, gave a loophole to (1) those who could not make up their minds before, (2) those who would work the Act anyway no matter what the terms were (nothing to lose, something to gain), (3) certain sections of the profession to whom money and the quickest ways of making it are all-important, principles and ethics of little or no importance—in short, renegades and black sheep. I must omit from these lists, of course, many honourable and straight members who conscientiously thought the Act an improvement on the present health service, and always said so from the start.

Naturally then, when the result of the second plebiscite was known defaulters made their mark, but even so the majority still refuse service, and what is democracy but the majority rule? Still we are told that if we can't get less than a certain number, minority wins. Who fixed this 13,000, and even if 13,000 voted for the Bill, could the Minister work it with these 13,000? What need was there for a second plebiscite at all, except to spend money which was so scarce some weeks ago? If the Minister conceded another principle might we then have a third plebiscite? Meanwhile he, the Minister

sends out his medical cards to the public before any agreement has been reached with the doctors. A diabolical trick to confuse and coerce them to accept the Act.

Finally comes the cardinal piece of cant. The resolutions of the Council ("considered judgment," when we all know there was only a small majority for resuming negotiations) under the first of which, while professing our altruism and magnanimity instead of our complete lack of spunk and courage, the profession is advised to work the Act provided the Minister continues negotiations and makes further concessions. After all that has happened, after all the experience the B.M.A. had with the Ministry, is it likely once the machinery is set in motion on July 5 that Mr. Bevan will be more conciliatory?

What a betrayal! What a come-down! As I said in my letter two years ago, Mr. Bevan cares little really for the National Health Act. What he does care for is to imitate and emulate his illustrious countryman, Lloyd George (though I am afraid he will have to be reincarnated), and when we are all nice quiet gentlemen doing our work under the State he will hurry back to Wales and tell his excited audiences that he has beaten the doctors to smithereens, got them where Lloyd George never did, and *ipso facto* he is the greater statesman of the two. That is the ambition behind all the sneers and insults and annoyances to a profession which I am sure has never harmed him but has always been ready to help the community and the country.

There is still time. The R.B. can yet save us. It's now or never. We must cling to our professional liberties and, most important, the liberties of those who come after us. If not, many unpleasant epitaphs will be written and thoroughly deserved.—I am, etc.,

Walton-on-Thames, Surrey. J. H. MELLOTTE.

Royal Colleges' Action

SIR,—The result of the latest plebiscite shows the profession nearly equally divided for and against the National Health Service. This contrast to our previous solidarity has been brought about to a large extent by three factors: (1) The action of the Council in turning down the Gateshead resolution without allowing a free vote of representatives; (2) the financial "sanctions" imposed by the Minister, who will not allow compensation to those joining the Service after the appointed day; (3) the attitude of the Presidents of the Royal Colleges, who, to quote Dr. Basil S. Grant (May 1, p. 854), "failing to learn from the unhappy results of their previous intervention, have superseded the Negotiating Committee in its dealings with the Minister."

We cannot now do anything about points (1) and (2), but it does seem important to take steps to prevent further interference by the Royal Colleges in the important negotiations still to come. The profession are now in a much weaker position than previously, and it is imperative to get rid of this Trojan Horse whose presence has twice had such disastrous effects. I can only suggest a strongly worded resolution at the next S.R.M. pointing out that no matter how strongly these gentlemen favour the nationalization of medicine (after all, the N.H.S. is only part of the nationalization programme) they represent only a tiny fraction of the profession, and that any further pronouncements by them be ignored. In addition, representations might be made to the Colleges asking them not to take any further unilateral action in support of the Minister.—I am, etc.,

Lincoln. G. A. BAGOT WALTERS.

Postpone Service

SIR,—We are told that it will not be possible to introduce an Amending Act until next session. It is impossible to frame terms of service for consultants until the Spens Committee reports—not earlier than July. Surely there is only one sensible course. Let us offer to attend our present N.H.I. patients under the old terms for a further six months while negotiations are continued. If Mr. Bevan agrees, it would give time to straighten out difficulties. If he does not agree, he would be doing a great disservice to the insured population, and the public would see it as such.—I am, etc.,

Birmingham. W. MORISON.

SIR,—We are mostly an inarticulate profession and leave letter-writing to the other man. However, that does not mean to say that we do not feel deeply how badly we have been let down by our Council. I write to support those who are asking for postponement of service until a satisfactory Amending Act is on the Statute Book, and I feel certain that a vote on this point would show an overwhelming majority of the profession in favour of postponement. We must not go into this Service until we can do so as absolutely free men and women.—I am, etc.,

East Horsley, Surrey. BASIL S. GRANT.

Hybrid Service

SIR,—It is not easy for those of us who cannot see behind the scenes to understand why, after such a long-continued expression of opinion against the conscription of doctors into a State service, the Council of the B.M.A. should suddenly advise doctors to join. Surely the Council realizes that nationalization will mean the end of British medicine as the world has known it? After a prolonged and tumultuous labour, a hybrid will emerge endowed with the characteristics of that parody of medicine, the N.H.I., and the sterility of Service medicine.

The true aspects of nationalization are being realized by the public now, and for the Government to extract money compulsorily for a national service which at the present time no branch of the profession can give is a piece of political infamy. We frequently wonder how the peoples of great nations like the Russians, the Germans, and the Czechoslovaks have in the past apparently willingly forsaken individual freedom for State serfdom, yet we Britons at the present time are doing something which differs not in kind but only in degree.

Many doctors who remained outside the B.M.A. because they have constantly disagreed with its policy must have joined to help in the fight for freedom. The deplorable action of Council now calls for resignation. Mine has already been sent to the Secretary.—I am, etc.,

Guernsey. FRANK R. NEUBERT.

Medical Partnerships

SIR,—Apart from (1) direction of doctors by committee rule and (2) loss of many doctors' houses and surgeries to medical practice which the forbidding of the right of sale of the goodwill of practices and partnership shares will involve, two further drawbacks emerge:

(1) *The partnership of work* will not be practical where the senior partner requires help to ease his work in a so-called inadequately doctored area. A doctor who takes a partner will find him quickly saturated with work, so that he will not be able to lighten the senior partner's work. This would be tolerable where the share has been purchased but will never work otherwise.

(2) *Doctors will not be able to retire* because already with the high rate of taxation few medical men can save for retirement, and after July 5, 1948, superannuation will not enable them to live in reasonable comfort, nor will a pension be sufficient for their wives, nor will the capital levy encourage anyone to save. Previous to this Act the practice and house could be sold and the sum obtained together with savings (the future superannuation) made a living possible, when supplemented by fees from a few private patients. This source of supplementary income will cease when the comprehensive service commences.

Even Mr. Bevan's belated concession that "consent" for doctors to choose their own partners and assistants will be "automatic" becomes inoperative when conditions arise in which partnership is discouraged and undesired. It is obvious that there are two separate elements in the reasons for having and choosing a partner: the first is suitability of character, the second the business element. The profession has been given the concession of the first, but this is meaningless without the second, the element of introducing the partner by sale of share.

Established doctors will select only a proportion of the doctors newly coming into practice, for whose entry the consent of the Central Practices Committee will be automatic, but the majority will still be directed by so-called "negative direction" and have to "squat" with a basic annual salary of £300 at the discretion of the three statutory committees whose decision will not be "automatic." This discrimination against the unselected is unfair.

There seems then to be an unanswerable case both for the public and the profession to press for independent medical practice. This can be achieved only by: (1) Retention of the right of sale of family practice; (2) retention of the right of sale of partnership shares;

(3) independent hospital service with independent administration and consultant service; (4) safeguards for those entering the State Service to prevent any political or other patronage from influencing appointments to hospital or family-doctor practice.

It is urged that doctors should not accept contract of service under this Act, either in the family-doctor or consultant service, until the Amending Act with its terms and conditions of service has been considered and accepted as workable by their representatives. This is not only on behalf of doctors and patients who are forced by economic pressure into the Service but also on behalf of those who are able to stay out of it. Doctors should negotiate as a whole for both groups.—I am, etc.,

London, W.1. GEORGE ROSSDALE.

Avoid Confusion

SIR,—In 1946 a powerful Government gave promise that the profession's avowed object—efficient doctoring based on pathology rather than the purse of the patient—might be realized. Instead into the medical arena was precipitated an ignominious Act.

Our victorious forces brought back to the mother country an expectant spirit. The strategic move of the Ministry was to have captured its volunteers instead of coerced and diffident doctors. Such an enthusiastic, well-knit profession would have achieved wonders while the "men and the guns" were being doubled for a national health campaign. The existing machinery of the profession was good—"double the quantity" was the main need, to give us time for early diagnosis and easy admissions when hospital beds were needed. Good health guarantees good production too.

But it was not to be. The Act made havoc of our machinery, replacing it by promises which are empty and never could provide the standard of service that we require. Instead of restoring and raising the prestige of the family doctor, conditions under the Act will breed a race of medical prostitutes as the gap between precept and practice widens. This truth has dawned on the busy lives of doctors and made them uneasy accomplices in a shabby service. There is a hollow ring now about the words of exhortation by the Minister when introducing the Bill, bidding us "dedicate our lives to the tasks of peace."

Elementary prudence indicated that instead of getting Parliament to pass it over our heads the Minister should have sought from the profession which has to work it the basic plan of a new health organization. Hasty fanaticism is out of place where even in these days the "man in the street" would proceed with caution. This omission doomed the Act to failure.

1948 is here and confusion reigns in place of construction. The appointed day draws on and there will follow it the day of public retribution over a degraded service, unless the people are warned and retrieve the deplorable situation that threatens. It is never too late to avert disaster, but all the more imperative to do so when one of such magnitude as the national health is at stake. Why preach "Keep death off the roads" if you avoidably pile it up in hospitals? Let our public relations committee flood the country with emergency meetings telling the people that the Act does not accord with the interests of either the public or the profession. Implore them to write to their M.P.s to amend the Act according to this proposition: "Doctors are all overworked and medical reform can only proceed by stages, starting with regionalization of hospitals and extension of panel benefits to the whole family and dependants of the insured as an interim measure."—I am, etc.,

Bristol. A. WILFRID ADAMS.

Civil Servants

SIR,—One must respect what Dr. Alfred Cox (May 15, p. 949) says, but must also note the remarks of Dr. H. Simpson, P.R.O. to Burnley Independence Committee (p. 950). The truth is that on July 5 doctors become unwilling Civil Servants, and we all know that the public will get what the New Zealand public have already—an unsatisfactory service. No doctor worthy of the name will neglect a serious case, but economic blackmail breeds utility.

A future Labour Government can make a new Act and enforce payment by salary. They could not do this if goodwill had been retained. The Council's jubilance at one concession undermined the last plebiscite. We at the periphery think we have been "sold out." The whole fight seems to have been in order to get a big majority in the February plebiscite. Is that all we have striven for, with all the meetings and journeys? Why consider public opinion on a complicated issue like this? Many people do not want this insurance forced on them, but they have not been asked, and a similar remark applies to the question of capital punishment.

As Dr. J. McIntosh Rattray (p. 951) says, in giving in to nationalization of our souls we are betraying the entire country. We had an opportunity granted to none others so far—to resist State servitude.—I am, etc.,

Newquay, Cornwall. J. P. O'SHEA.

Regular Working Hours

SIR,—At this time when the hours of "workers" are so carefully regulated to minimize fatigue and to allow for leisure there is an opportunity and a justification to be rid of the ridiculous evening surgeries which have been so burdensome to the general practitioner. Mr. Bevan has said that the National Health Service should be to the advantage of doctor and patient alike. Let us then insist most firmly upon hours which will allow some chance of relaxation and not accept times laid down by the Executive Councils as we did under the old panel system.—I am, etc.,

London, W.1. R. M. AYTON-ORMSTON.

Policy for Peoples

SIR,—Your leading article on "Policy for Peoples" (May 15, p. 939) has an ominous ring. You state that the aims of P E P (Political and Economic Planning) are to increase the size of families and at the same time to widen the scope of contraceptive clinics. Just why the scope of contraceptive clinics should be widened if increase in size of families is to be encouraged is difficult to understand. One would have thought that all experience tended to the opposite view.

Then you say that P E P "expects a great deal from the National Health Service." Some of us who voted for the Bill did so in the faith that a British Government would always have a bias on the side of individual liberty. Yet you say that "in giving contraceptive advice generally doctors will help to foster the new attitude to parenthood without which a population policy based on democratic principles is bound to fail." Does this mean that doctors by their work would be expected to foster a Government policy, that is if the Government were to accept the advice of P E P?

Finally, you say that "there are individualists who maintain that no attempt should be made to influence people's reproductive behaviour." This naive statement might be more convincing if instead of the word "individualists" were substituted the word "individuals," for among the individuals concerned might be found the majority of the mothers and fathers of families in this country.—I am, etc.,

Braintree, Essex. M. C. WILKINSON.

Otosclerosis

SIR,—It is not my desire to take up valuable space in your journal in order to prolong unduly an argument about otosclerosis, but I would like to place on record the conclusion which I and my colleague, Dr. J. Salomon-Danic, have drawn from a hundred fenestrations performed in the last 18 months.

First, it seems to me that the results should only be assessed after the lapse of at least a year; they seem to me to be roughly proportional to the value of pre-operative bony conduction, grouped according to Shambaugh's classification (a loss of 30 decibels in the 3 "conversational" frequencies—512, 1024, and 2048—dividing the cases into three classes, A, B, and C). Although this classification is imperfect, it seems to me to be worthy of retention, and in the evaluation of end-results it should play a part. Further, the improvement in bony and aerial conduction in the ear not operated upon, although very inconstant, is not a myth; a comparison of pre-operative and post-operative audiograms permits its recognition. Sourdille had already drawn attention to it a long time ago. Up to now

the reason for this peculiar phenomenon appears to be unknown. It seems, however, to be purely transitory.

Lastly I think that, in the interests of the patients and for the sake of the reputation of the operation, fenestration ought only to be performed by surgeons already perfectly trained in aural surgery and with considerable experience of fenestration on the cadaver. It appears to me that professional ethics forbid the performance of this very specialized operation by surgeons who have not the necessary training.—I am, etc.,

Hôpital St. Antoine, Paris. PAUL DUBS.

Cutaneous Cancer

SIR,—Your leading article on the above subject (May 22, p. 986) recalls an experience which may amuse your readers. In the early summer of 1937 the Bill which became subsequently the great Factory Act of 1937 was considered in Standing Committee. The Committee consisted of 70 Members of Parliament drawn from all Parties, and for the greater part of its activities I was the only medical Member. There were 27 sessions of the Committee. The Bill bristled with medical problems, and, being the only Member with medical experience, I was a frequent speaker. Sir John Simon, as Home Secretary, was in charge of the Bill; my seat was directly behind his, and duologues between him and myself were constantly repeated. One of our most serious disagreements came over the schedule of industrial diseases subject to notification.

The Bill was a consolidating Bill, superseding all previous Factory enactments, whose purpose and effect would be to legislate for a generation to come; the previous main Act was dated 1901. In that Act a number of diseases had been scheduled as notifiable the incidence of which had materially diminished in 36 years, and other diseases had assumed greater importance. I pointed out that phosphorus poisoning, notifiable in 1901, had almost ceased to exist in 1937, but cutaneous cancer showed a sharp upward curve of frequency. I contended that phosphorus poisoning should be omitted from the notifiable schedule and cutaneous cancer included, notification of which, I argued, would lead to earlier recognition and treatment and thus prevent the serious consequences which were frequent in overlooked or neglected cases. I was overruled with the argument that it was "administratively convenient" to transfer as many of the items as possible from the 1901 to the 1937 Schedule, and the Schedule of notifiable industrial diseases in the 1937 Act (*vide* Section 66) remains, as in 1901, restricted to "lead, phosphorus, arsenical or mercurial poisoning, or anthrax."—I am, etc.,

House of Commons. E. GRAHAM-LITTLE.

Risks of Dicoumarol Therapy

SIR,—In your annotation on the risks of dicoumarol therapy (May 22, p. 988) the work of Glueck and her colleagues[1] is quoted on combined heparin-dicoumarol therapy in coronary thrombosis, the results in a treated series of 44 patients compared with 44 controls being as follows:

Thrombo-embolic complications

	Present	Absent	Total
Treated	3	41	44
Controls	12	32	44
Total	15	73	88

	Died	Recovered	Total
Treated	9	35	44
Controls	20	24	44
Total	29	59	88

It is then stated, "Though these figures may not satisfy statistical demands, it is only by the accumulation of the results of careful clinical studies that final decision will be reached on this important problem." Readers may be puzzled as to why significant differences are dismissed as not satisfying statistical demands, so it may be helpful to point out how the misconception has arisen, a misconception that is due to the authors of the paper rather than to the writer of the annotation, for he has simply quoted their conclusions.

In the body of the original paper the data referred to 25 treated patients and 25 controls, and among these neither of the differences shown above, though favourable to the treated, is significant, as is pointed out in the conclusions. A short addendum is then appended giving results for a further 19 treated patients and 19 controls, observed after the manuscript had been submitted. The authors, however, do not point out in the addendum that with the addition of these new results the previous conclusion as to the statistical significance of the differences requires modification.

Both the tables shown above give $\chi^2 = 5.143$ (using Yates's correction). Thus in both instances the chance of drawing two such diverse samples from a homogeneous population is no more than 1 in 43, the usual conventional level of statistical significance being 1 in 20. The authors selected patients for the two series by the sound method of choosing alternate subjects for treatment. They remark in their conclusions (on the total of 50), "Although the series of cases is too small, and the variables of the disease itself too wide to make statistical analysis significant . . ." This might be taken to imply that even if the results were significant they would still be doubtful, owing to the variability of the disease, as to whether differences might not be due to some accident in the selection of alternate patients rather than to the results of treatment. They have, however, tested a considerable number of variables, and scrutiny of their tables shows (in the first 50 at least) that none could account for the more favourable experience in the treated group. If then detailed analysis of the 38 additional patients yields the same results as the original series, it would seem that a good, though not of course overwhelming, case had been made out for the beneficial results of anticoagulant therapy.—I am, etc.,

London, W.C.1. J. A. FRASER ROBERTS.

REFERENCE

1 *Amer. Heart J.*, 1948, **35**, 269.

Peptic Ulceration

SIR,—I am very glad to hear Mr. C. Jennings Marshall's approval of the analogy between the pains of chronic peptic ulcer and of chronic ulcer of the leg (March 13, p. 522), but I am sorry that he is dissatisfied and has reservations, seen in his question, "Surely the production of pain in the peripheral nervous system has a mechanism different from that in the viscera?" Then again, it appears that he is dissatisfied with the secretory function as a middle term in the pain mechanism, so he selects the motor function. This is not very strong positive evidence in favour of his middle term and I am sure he is dissatisfied with this position also. He rightly indicts the physicians (I would have added the physiologists) for not properly correlating the various factors. Mr. Jennings Marshall has shown a tendency to advance beyond old hypotheses. If he would only move a little further in the same direction he could rid himself of his dissatisfactions.

His first step must be to answer his own question. The nervous system is (to use the words which he applies to pathology) "one and indivisible." Surely, therefore, the production of pain in the peripheral nervous system has a mechanism no different from that in the visceral. There may be a quantitative difference because pain fibres are more sparse and less efficient in the viscera, but surely there is no essential difference.

Next, he insists that "food relationship of ulcer pain inevitably introduces gastric function as a middle term." Food relationship inevitably introduces gastric function, but not necessarily as a middle term. It only becomes necessary to introduce the awkward middle term if the stomach functions are conceived in terms of only a secretory and a motor system. But, if it be remembered that the stomach has in addition a functioning circulatory system, gastric function will be found already included in the first term. In the leg, the circumulcerous cellulitis and circulatory changes directly explain the pain, without the interposing of directly painful motor behaviour of the leg.

A further advantage of these forward steps is that Mr. Jennings Marshall will find that his own favourite "most

potent cause," the ebb and flow of inflammation, will be found adequate to explain the symptoms without the interposition of direct motor causes. Moreover, he will no longer fear the Greeks, even when bearing a question about pain-relief from haemorrhage, for he will be able to discard "muscular atony from acute anaemia" as an unsatisfactory explanation, either in peptic ulcer or congestive dysmenorrhoea. Such prostration, as is implied, does not necessarily accompany pain-relief.

Finally, if he leaves out the myogenic middle term, he will not be called upon to explain how nebulous motor disturbances can directly cause pain in ulcer patients, while definite and violent motor disturbances fail to cause pain in obstructive or regurgitant vomiting after gastro-enterostomy, or in obstruction at the duodeno-jejunal flexure due to carcinoma. Nor will he be asked to explain why, in pyloric obstruction, "the very powerful peristaltic waves which can be seen through the abdominal wall are rarely accompanied by any discomfort" (Hurst and Stewart).—I am, etc.,

Sydney, Australia. V. J. KINSELLA.

Acute Intussusception in Childhood

SIR,—I read the article on acute intussusception in childhood by Drs. Brenda Morrison and Donald Court (April 24, p. 776) and letters in subsequent issues. The authors of the article state that it is very difficult to satisfactorily examine a healthy baby. With this I cordially agree, and it is particularly difficult during the contractions of the intussusception (when it is hard and most palpable) because then the baby yells most lustily. It is at this stage that, barring accidents, 100% of the babies should be saved.

There is only one way by which one can make absolutely certain that an intussusception is or is not present—that is by a bimanual exploration with the right forefinger in the rectum, under anaesthesia. Quite light anaesthesia is sufficient and chloroform the best anaesthetic. If the case is in hospital the child can be examined in the theatre and either the abdomen opened or the surgeon retire with a perfectly easy mind. The authors of the article and subsequent correspondents make no mention of this method. By carrying it out one can explore every part of the abdomen in a child under 2 years.—I am, etc.,

Great Yarmouth. LEONARD LEY.

SIR,—May I add a further point to Drs. Brenda Morrison and Donald Court's timely article (April 24, p. 776) calling for earlier diagnosis in acute intussusception in children? Under the heading "Signs in the Abdomen" insufficient stress is given to palpation of the abdomen. In the initial stage of the condition, and before obstruction and peritonitis have occurred, the mass is only palpable during active peristalsis, and it may be necessary to palpate the abdomen several times before a clear and unmistakable cylindrical tumour is felt. Usually colic occurs at that instant, but it may not be severe. Only by *repeated palpation in the early stages,* when vomiting and flexion of the thighs or the abdomen are the presenting signs, will the initial and pre-inflammatory stage of intussusception be diagnosed.

Mention is made in the article to the similarity in description in most British textbooks, and I would refer the authors of the article to that given in the 4th and 5th editions of the textbook on paediatrics published by Messrs. E. and S. Livingstone.—I am, etc.,

London, W.1. BRUCE WILLIAMSON.

Pain in Phantom Limbs

SIR,—I was very interested in Dr. J. Donaldson Craig's letter (May 8, p. 904) on "Pain in Phantom Limbs." The subject of painful stumps is a difficult one. As a medical student I do not remember a single instance of my teachers telling me anything about the subject; and as to the question of phantom limbs the paucity of the literature concerning this distressing condition speaks for itself. Space does not permit of my dealing with painful stumps and I will therefore only briefly discuss my views on phantom limbs.

In the intact body there is a continuous stream of impulses bombarding the cortex from the sensory nerve endings in the muscles of the body. This bombardment is evenly balanced on both sides and in a state of equilibrium. When a limb is amputated a neuromuscular imbalance immediately results (see diagram). This will play a great part in future motor activity of the individual and will influence his phantom limb.

It is the readjustment of the remaining muscles of the body to the altered state which now throws additional strain on the sensitized cerebrum and makes the previously existing state of equilibrium so liable to be upset. It is the constant effort of the central activity to maintain this equilibrium between the continuous stream of impulses from the remaining part of the body which makes a phantom limb an ever-present possibility and brings the awareness of the absent member to consciousness.

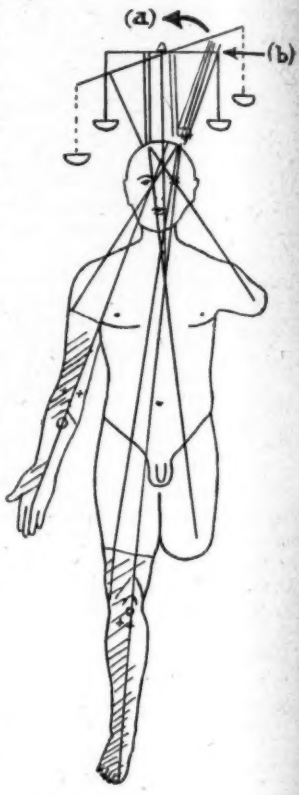


Diagram showing (*a*) imbalance produced by amputation, and (*b*) normal state of equilibrium.

The capacity of the individual's sensorium to readjust itself to the new conditions of his body and its new environment after an amputation may or may not give rise to the varied manifestations of a phantom limb. The physical alterations and mental fluctuations in his subsequent life will act as stimuli and as predisposing factors to cause a central release which will result in pain in the phantom. All amputations are associated in the mind of the individual with a varying degree of pain. This is not dependent on whether pain has preceded the amputation. Further, the individual will react to this pain according to the degree of subconscious pain which already exists in his sensorium, and this phantom pain will be further modified according to his level in the phylogenetic scale. It has been noticed that highly intelligent, sensitive patients are more prone to phantom pain than the more plethoric, unimaginative individuals.

It has been observed that wearing an artificial limb is often a comfort to the patient with a phantom pain, and tight bandaging at night, when his phantom pain becomes aggravated, relieves this pain. In fact, many individuals often hold on firmly to their stumps with both hands in order to relieve the pain. This pressure has the effect of restoring temporarily the balance of the impulses which impinge on the sensorium and so relieves the pain. These observations influence treatment. The patient himself often doubts the reality of his own sensations. Fear of accusation of insanity makes him reticent to talk about his symptoms and he prefers to hide them until he can no longer bear them. This may result in gross mental disturbance, and the sufferer of a phantom limb is often regarded as psychotic.

The patient who shows the slightest indication of phantom pains should be told that we believe he gets these pains—that they are very real to him; and, since he has lost his limb, from his point of view there is no foundation for the stimulus now. Eventually the pains will cease, which indeed they often do.

I agree with the statements that all the operative measures on these conditions usually fail, and I would like to point out that local injections are of very fleeting value. A simple and effective method of treatment by firm bandaging of the stump bears out the hypothesis which I have postulated above: "Sensation removed by amputation must be replaced by further sensation." I would further like to say that phantom limbs are not analogous to causalgia. Amputations of the fingers are not infrequently accompanied by causalgic pains, while phantom pains are rare in fingers because there has been no loss of bulk stimuli. Causalgic pains are not relieved by pressure: phantom pains are.—I am, etc.,

Queen Mary's Hospital, Roehampton, London, S.W.15. LEON GILLIS.

SIR,—May I add a few notes to the reply to the inquiry concerning pain in phantom foot ("Any Questions?" April 24, p. 817)? French statistics show that 72.5% of all amputees, at least, complain of pains, most of them being phantom pains (personal statistics).

In 1938 I established that such pains are greatly relieved with parenteral thiamine in a very high proportion of cases. When this quite easy method fails to give relief we perform a sympathetic ganglia "novocain" block or a periarterial injection of novocain. Intra-arterial administration of the drug sometimes relieves the pain immediately and suppresses the phantom limb sensations. At the next stage we proceed with lumbar or cervical sympathectomy, advisable in cases in which the block gives only transitory relief. The surgical treatment of the main sensitivity route (excision of the terminal neuroma, radicotomy, cordotomy) is performed in cases of failure of the above-mentioned more conservative methods.

Recently some authors claimed the success of excision of the cortex, but their trials seem to remain merely in an experimental stage. Lately, psychotherapy has been introduced in the treatment of this very refractory condition.—I am, etc.,

A. SLIOSBERG,
Consulting Physician of the Fédération des Amputés de Guerre de France.

Paris.

Tetanus Neonatorum

SIR,—The two cases of tetanus neonatorum recorded by Drs. C. A. St. Hill and H. Lederer (May 22, p. 980) lead me to report the following:

On May 14, 1948, there came to my clinic a young man, aged 21, complaining of pain in the front of the left thigh which had been present from infancy; he said he rarely went a week without it. He had been called up at 18 for military service and had been graded A1 and served his full time. He was accompanied by his mother, who told me that he had been under my care in the Lincoln County Hospital when aged 12 days, with tetanus.

I immediately remembered the case, for it was most remarkable. I looked up the notes, but unfortunately they were scanty. He was born at full term, and breast fed until 7 days old, when his jaw was "locked" and he could not suck; he had had nothing for the 5 days prior to admission. Temperature was 104° F. (40° C.). He was wasted and profoundly dehydrated. Every muscle was in extreme tonic spasm, and the legs were crossed in extension. He could be held in any position, the head, back, and limbs being perfectly rigid. Placed on the palm of one's hand he was like a piece of board. He remained in this condition for about three weeks and then began to recover, often having appeared on the point of death. The stump of the cord was septic as well as the prepuce. He was fed by nasal tube and later with a dropper. 800 units of A.T.S. were given intrathecally. The C.S.F. was clear and not under pressure.

On May 14, 1948, he appeared a healthy young man with a slightly waddling gait. He was working as an apprentice electrician. My examination revealed nothing to account for the pain; in particular his C.N.S. was not abnormal. I referred him to my colleague, Mr. E. J. Bilcliffe, orthopaedic surgeon, and he reports as follows: "Marked loss of power in his left quadriceps, and can barely hold his leg from the couch; some limitation of movement of left hip." *X* rays of both hips show marked coxa vara, with considerable shortening of necks of both femora and very shallow acetabula. The coxa vara on the left side is more pronounced than on the right. Is the tetanus a factor in the cause of the condition?—I am, etc.,

Lincoln. H. CECIL BARLOW.

Inserting Needle for Local Analgesia in Dentistry

SIR,—To minimize the pain of inserting the needle into the gums we have a number of analgesics for surface application at our disposal, but we cannot depend on surface application alone because of its insufficient penetration, and the technique of inserting the needle has to be added. Already in my time as assistant it was my aim to make the dreaded insertion of the needle as humane as possible. Guided by this principle, I soon found that only the insertion of the needle at absolute right-angles to the injection surface brought favourable results. The reason for this is that the skin remains in its place and not stretched away by the pull or pressure of the needle. By injections for extractions of teeth, although it may not always be possible to place the needle in at right-angles, one can follow the described principle as far as it is possible.

This process—with the exception of palatinal injections—is done in three phases. The first phase is the short and quick insertion of the sharp needle into the skin. The second phase consists in bringing the needle almost into line with the skin. During the third phase the needle is by constant flow of analgesic brought slowly to the position where the injection fluid is to be discharged. All injections which are easily accessible can be done according to the described three-phase system from "vestibulum oris" with the mouth not being much opened. According to requirements the teeth can also be completely closed. Awkwardly accessible are the injections in the lower jaw from "cavum oris." One is here compelled to follow the described principle as much as possible.

For the extraction of the lower molars the "endosteal" injection method is more to be recommended, and I refer here to my publication "Das endostale Injektionsverfaren zur Extraktion unterer Molaren," in *Schmerz–Narkose–Anästhesie*, Leipzig, 1937, vol. 1, and *Folia Stomatologica* (Zagreb), 1939, Part 1.

Before writing down these small points about the injection technique in the sphere of dentistry, the thought came spontaneously to me that any pain-reducing measures, however small, should be made available to the practitioner. The fact that on the publication of my article on the same theme in 1943 in the organ of the Bulgarian Odontological Federation, Sofia, the editor of the *Zahnärztliche Rundschau*, Sofia, made a footnote of appreciation expressing his pleasure in printing this work, shows for me that I followed the correct course.—I am, etc.,

(10b) Frankenhausen Nr. 32, über Crimmitschau, Germany, Russian Zone. JACOB VIANDEN.

The Problem of Caries

SIR,—Mr. J. F. Volker (May 22, p. 1000) suggests that the most unsatisfactory aspect of dental caries research is unscientific criticism by medical colleagues and explains this attitude as resistance to new ideas. This seems a superficial view of the unsatisfactory state of medical knowledge and opinion.

First, there is nothing new in the idea that caries is the result of acid fermentation of food residues, and that sugar is especially responsible has been recognized for centuries. Recent dental research has not done much more than slowly accumulate piecemeal experimental evidence of what was already obvious from general observations of diet and dental disease.

Secondly, the problem of caries is not its histopathology, which is now fairly well understood, but the practical and sociological problem of its prevention. Doctors, in Britain at least, have done as much to solve this problem as dentists. The names of Drs. Harry Campbell, James Wheatley, and R. A. Lyster come to mind, and of course Dr. J. Sim Wallace, who is a dentist as well. How can doctors, without formal training in dental pathology, be expected to appraise adequately the voluminous and confusing literature on dental disease? A great part of this is itself unscientific and some of it is frankly antiscientific.

The medical profession might be blamed for completely handing over to dental surgeons responsibility for dental health, instead of merely delegating dental surgery to them. The dental profession, having gained independence, is much more to be blamed for failing to inform the medical profession and the public in a coherent way how dental disease should be prevented. Volker mentions the repeated experimental proof that fluorine applications reduce caries by 40% in American children. English dentists are simply incredulous; they scarcely seem to distinguish between this completely substantiated claim and the vague, exaggerated, or unsubstantiated claims made for vitamin D, calcium, or humus-grown vegetables! Whose fault is this? Surely not our medical colleagues'?

While research has shown that the defects of modern diet which are responsible for caries are not, in the main, nutritional deficiencies, yet the country's diet is planned for health on purely nutritional considerations. The B.M.A. has appointed a nutrition committee; could it not invite the B.D.A. to assist it with an authoritative statement on the dietetic prevention of dental disease? Collaboration of this sort in the U.S.A. has been very fruitful.—I am, etc.,

London, N.W.6. R. B. D. STOCKER.

Curare in Treatment of Spastic Conditions

SIR,—Dr. Edward B. Schlesinger (May 8, p. 905) queries the potency of the curare in oil used in the treatment of our spastic cases. Only two preparations were available to us, that supplied by Messrs. Burroughs, Wellcome and Co., and that by Messrs. E. R. Squibb and Sons ("intocostrin"). After a trial of both we preferred the former as it appears to give more uniform results. Of its potency there can be little doubt judged by the production of diplopia, a feeling of drunkenness, and ataxia in many cases.

The experiment was an attempt to determine the clinical value of the drug in cases with pyramidal spasticity (hypertonus). We think that the evidence of patients in such conditions is of more value than the myogram and motion pictures, for such a drug is of no practicable value unless the patient is improved so that he can appreciate the improvement.

We note with interest that Dr. Schlesinger in his detailed report of four cases (*Arch. Neurol. Psychiat., Chicago*, **55**, 530) refers to subjective improvement and "perceptible decrease in spasticity" without mentioning the myogram, the range of motion changes, or other data "gleaned from the skills of the physiotherapist and neurologist."—We are, etc.,

C. ASTLEY CLARKE.
R. D. HOTSTON.

Liverpool.

The Mystery of the Eosinophil

SIR,—With reference to the interesting leading article on eosinophilic mysteries (May 15, p. 938), most common causes are mentioned, with one exception. Later it is stated that eosinophilic pleural effusions are common but unexplained. Surely tuberculosis is a common cause of eosinophilia in the blood, and also the cause of the unexplained eosinophilic pleural effusions? There is a well-known paper by Dr. L. S. Fry on eosinophilia in tuberculosis. Perhaps the learned writer was just trailing his coat here to invite discussion.—I am, etc.,

Epping, Essex. FRANK MARSH.

SIR,—Completeness is too much to hope for in reviewing within the space of a leading article (May 15, p. 938) such a complicated subject as eosinophilia. I was disappointed, however, that you did not mention familial eosinophilia, a rare but well-established condition.[1]

Histamine may well be the "missing link" which connects together the various conditions in which eosinophilia is commonly found. In nearly all of them there is evidence of protein disintegration[2] and allergy with consequent excessive production or liberation of histamine.[3] This substance is found in appreciable quantities in the granular cells, and especially in the eosinophilic cells.[4] The blood in eosinophil leukaemia contains a large excess of histamine.

My only attempt to verify this hypothesis has been unsuccessful. "Benadryl" and "anthisan" did not produce any consistent changes in the peripheral blood in a small number of cases of eosinophilia of various origin. This crude test, however, is not conclusive in either way.

The hypothesis has the attractiveness of simplicity, but, as always in science, facts must have the last say. Further research is needed, and I hope this letter will stimulate it.—I am, etc.

London, N.21. E. MONTUSCHI.

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3 Gaddum, J. H., *British Medical Journal*, 1948, **1**, 867.
4 Code, C. F., *J. Physiol.*, 1937, **90**, 485.

Harrison's Grooves

SIR,—Drs. J. Naish and H. R. E. Wallis (March 20, p. 541) have no doubt made a very useful contribution on the matter of Harrison's grooves, as you say. However, they should take more care with their anatomy. I quote from their article: "The insertions of serratus magnus interdigitate most intimately with those of the external and internal oblique muscles. Moreover, the line of insertion of serratus magnus runs diagonally across the site of Harrison's grooves."

The insertion of serratus magnus is, in fact, into the vertebral border of the scapula. The lowest three or four slips of origin of serratus magnus do indeed interdigitate with the external oblique muscle of the abdomen; but serratus magnus has no interdigitation with the internal oblique muscle, intimate or otherwise.—I am, etc.,

Melbourne. ROBERT S. LAWSON.

Termination of Pregnancy

SIR,—A recent trial served to draw attention to the medico-legal aspects of termination of pregnancy on psychological grounds. This is a comparatively new concept in both medicine and law and one which, from its very nature, abounds in difficulties. Whether the grounds are physical or psychological, it is essential to consider the woman as a total personality against her own personal background and that of the contemporary world. If she is married the marital relationship and the husband's attitude are vital considerations. Of equal importance is the question of whether or not the woman wants the child, since, obviously, if she does not, the prognosis is less favourable.

In addition to these general considerations others apply in psychological cases and present peculiar difficulties. When physical grounds are presented we can usually verify the patient's condition and make a reasonably certain prognosis of the effect of pregnancy. In psychological cases, however, we are dealing with imponderable and to a considerable extent unpredictable elements. Even with far greater knowledge than we have, we should still be handicapped by the difficulty of applying objective tests to the mind in general and the fact that each individual mind is unique and that its reaction to a given set of circumstances cannot be prognosticated with an equal degree of certainty. It is essential to obtain some confirmation of the history which patients give in psychological cases, since the picture which they present will inevitably be coloured by their highly emotional state.

Perhaps the greatest difficulty, and one which seems all too often to be overlooked, is the psychological trauma—the profound and lasting feelings of guilt and remorse—which can result from termination of pregnancy. Even when continuance of the pregnancy would be inadvisable from every point of view, the psychological effects of termination might prove far more disastrous. In other words, termination is not the simple solution that it may appear to be on the surface. The choice between termination and continuance of pregnancy is rarely, if ever, one between good and evil, it is practically always one between a greater and a lesser evil. The determination of the lesser evil can never be certain. Nor are there any easy compromise solutions.

Perhaps the most common advice given to single girls is for them to have their babies and offer them for adoption. This may seem the only solution, but in fact it is rarely a satisfactory one. While escaping the stigma of unmarried motherhood, many of them will be haunted all their lives by guilt and remorse, especially if, as nearly always happens, they are allowed to see their babies and even persuaded to nurse them before adoption.

However much experience may lie behind our decision to terminate or to recommend the continuance of a pregnancy on psychological grounds, we can never be certain of the result. I personally terminated two pregnancies and recommended the continuance of one to preserve the women's health, only to find that in all three cases their entry into mental institutions had been hastened. The more experience we acquire in this sphere, the more we realize the difficulty of assessing a case, with its tragic result that at our present stage of knowledge and experience many pregnancies are terminated which should be continued and many continued which should be terminated.—I am, etc.,

London, W.1. EUSTACE CHESSER.

Barbiturates in Acute Porphyria

SIR,—Dr. Ernest Petrie (May 15, p. 926) describes a case of acute porphyria which shows many of the usual signs and symptoms of the disease. It is commonly stated, though so far as I am aware with insufficient evidence, that barbiturates may increase the severity of an attack, or even initiate one. Neither of these misfortunes befell Dr. Petrie's case, in spite of his patient having received phenobarbitone in the course of treatment. Discombe and I[1] described a somewhat similar case, and we were fortunate to be able to follow the progress of the

patient daily for two years. During this time he had four acute episodes, of which the first and the fourth were severe. During the first and second episodes he was given phenobarbitone, gr. 1 (65 mg.) twice daily, for several weeks, but without any untoward effect. As our patient was under such close observation we were in a position to publish a chart which showed his weekly change in body weight. The graph revealed that the earliest sign of an impending relapse was a progressive and marked loss in weight. In the severe attacks this loss in weight antedated the abdominal symptoms by several weeks. The two minor episodes might have passed almost unnoticed were it not for the warning weight loss.

To be in a position to show that any drug causes an acute episode in this disease it is at least necessary to demonstrate that after its administration a loss in body weight accompanied by the usual train of symptoms occurs. The evidence which incriminates the barbiturates is not convincing.—I am, etc.,

London, E.C.1. J. L. D'SILVA.

REFERENCE

1 *British Medical Journal*, 1945, **2**, 491.

Manipulation in a State Service

SIR,—May I take this rather late opportunity to refer to Dr. J. H. Cyriax's letter (Feb. 21, p. 362) entitled "Manipulation in a State Service"? The importance of this neglected form of therapy has been stressed in some quarters through the years, but has apparently passed unheeded as far as the average practitioner is concerned. Manipulation is still shrouded in mystery and those who practise it are still regarded with suspicion.

So long as manipulation is not taught, and taught expertly, so long will a valuable field of therapy remain in unorthodox hands and so long, quite unnecessarily, will catastrophes occur with its use. But, Sir, it is the doctor who must be taught and not the physiotherapists alone, as Dr. Cyriax recommends.

The correct use of manipulation in the first instance depends on diagnosis, and this is the doctor's duty. It is the doctor's duty also to know when to manipulate and how far his manipulation should go. It is the physiotherapist's duty to maintain the range of movement which the doctor restores and not to try to improve on it, for anything that may go wrong—and even in the most experienced hands things do go wrong—is the responsibility of the doctor.—I am, etc.,

Auckland, New Zealand. JOHN MCM. MENNELL.

Criticism in Colonial Medical Service

SIR,—I am forwarding the following to you as I feel it may be of interest to those engaged in the struggle over the Health Service and freedom of criticism of this service. It is from a Colonial Office circular about an essay competition organized by the National Association for the Prevention of Tuberculosis, and shows, I think, the fear of criticism existing in the minds of Ministers and higher officials of any Government service.

Like many others, I joined the Colonial Service after this last war full of high hopes, but already I am sadly disillusioned, not by the lack of clinical matter—this is immense—but by the lack of facilities for diagnosis and treatment. Drugs and dressings are doled out by the medical stores in an unbelievably parsimonious way. I have not even a blood-counting apparatus, and such things as vitamin concentrates—almost an essential with every patient here—are practically unobtainable. When I have ventured to ask for such things I am informed that they are not stocked. Anyway, here is the extract for you. It is from Circular 12412/12/48 from the Colonial Office, the Church House, Great Smith Street, London, S.W.1, and appears over the signature of A. Creech-Jones.

Para. 3, Rule 8 [of the essay competition] provides that essays sent in shall become the property of the National Association for the Prevention of Tuberculosis and that any of them may be published at its discretion in the author's name. In order to ensure that nothing is published which might misrepresent the policy of Colonial Governments or of His Majesty's Government, the Secretary-General of the Association has agreed to arrange that essays which it is desired to publish should first be submitted to the Colonial Office, and in view of this I do not expect that you will think it necessary to require competitors to send in their essays through the heads of their Departments. However, I would not object to your imposing this requirement if you thought it desirable.

This, I think, shows an unwillingness of the authorities to allow publication, or, if heads of departments also intervene, even submission of any material which might contain any criticism of either the Colonial Service or its policy or deficiencies. In this territory there is no scheme for control, diagnosis, or treatment of tuberculosis, and as far as I know no real desire for one.—I am, etc.,

ANOTHER EAST AFRICAN.

Professional Secrecy in Services

SIR,—While serving as a naval medical officer I was ordered by my commanding officer to divulge the name of a rating suffering from gonorrhoea. I had previously complained regarding this matter in my quarterly report and on this occasion I refused to give the name. As a result I was placed under arrest and relieved of my duties as a medical officer for disobeying an order. The final outcome was obscured by my charge being unrelated to this event. As this matter still rankles and is of some importance, as pointed out by previous correspondents, with regard to a State health service, I would be glad to know of the legal pros and cons of this situation.—I am, etc.,

EX-SURGEON LIEUTENANT, R.N.V.R.

Must the Doctor Tell?

SIR,—The frivolous and irresponsible attitude revealed in recent letters from R.A.F. medical officers (April 17, p. 750, and May 8, p. 907) on V.D. probably shocked numerous others with Service experience apart from myself. Clearly it is necessary in a disciplined service that a commanding officer should be acquainted with all facts concerning the welfare and efficiency of his men. If medical officers arrogate to themselves the decision to keep V.D. secret, they are simply not doing their duty. Such muddle-headedness is nothing to be proud of, nor does it imply a high ethical standard professionally.

In recent years the Air Council have from time to time expressed concern at the standard of discipline in the R.A.F. Your correspondents' impunity would seem to corroborate this. "Flight Lieutenant" was right in at least this point when he wrote, "Of course we should have been court-martialled . . ."—I am, etc.,

London, W.8. GEOFFREY G. SHERRIFF.

POINTS FROM LETTERS

Direction and Right of Appeal

Dr. B. H. SHAW (St. Mawes, Cornwall) writes: . . . Compromise is all very well on minor matters, but direction and absolutism on the part of the Minister are very grave issues as far as freedom is concerned. Are we or are we not to remain free from bureaucratic interference in discharge of our professional duties? That is the crux. Dr. Cox considers that the best way to prevent the Labour party from carrying out their declared intention at some future time would be "to use the interval for providing such a satisfactory service that the public would be against any attempt to unsettle the profession once more." It is not sufficiently realized that there is a very considerable difference between the views of the public and the ambitions of bureaucracy. The granting of the right of appeal is essential.

A Plea for the Aged

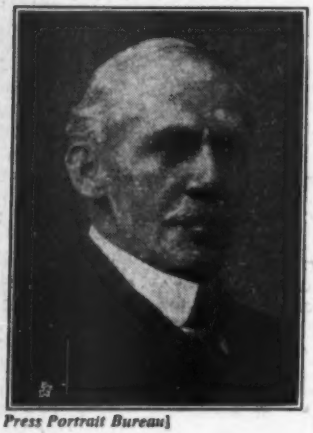
Dr. D. J. GAIR JOHNSTON (Birkenhead) writes: It is now well over a year since I startled my fellow councillors by stating that the general fitness and stamina of the people were definitely deteriorating. . . . The knowledge of nutrition in all its phases—digestion, absorption, assimilation, and elimination—is far from complete and allows no room for dogmatism. The question of getting sufficient nourishment of a kind suitable and agreeable to old people whose physical and digestive powers are failing is a real problem and, if they live alone, truly pathetic. . . . As a medical officer to a Home for Aged (about 180 inmates) for 25 years, I notice the dead hand of deprivations and restrictions has caused a very obvious depression. No smiles, no light-heartedness—just a dead monotony of gloom compared to other days. If those in authority would only realize that human beings are really human, not mere animals to be fed on calories, it would help to bring back a little of that light-heartedness and joy which is so lacking to-day in all classes of society.

Obituary

SIR GEORGE NEWMAN, G.B.E., K.C.B.

Former Chief Medical Officer, Board of Education and Ministry of Health

We announce with regret the death on May 26 at the age of 77 of Sir George Newman, who held for twenty-eight years the position of Chief Medical Officer of the Board of Education. Sir George Newman was also Chief Medical Officer of the Ministry of Health from the time of its creation in 1919 until his retirement in 1935. His service at Whitehall covered the period of the rise and growth of the school medical service and saw the initiation of some of the outstanding developments in public health.



Press Portrait Bureau

George Newman, the son of Henry Stanley Newman, of Leominster, Herefordshire, came of Quaker stock. He was born on Oct. 23, 1870, and studied for his profession at Edinburgh University and at King's College, London. He graduated M.B., C.M. in 1892, and took the M.D. of Edinburgh, with the gold medal, in 1895. In the same year he took the Cambridge D.P.H. From 1896 to 1900 he held the post of senior demonstrator of bacteriology and lecturer on infectious diseases at King's College, of which he was later to become Fellow. By the early years of the present century he was already known as a writer on public health subjects, having published works on the bacteriology of milk, on the relation of bacteriology to public health, and on infant mortality. Dr. Newman's first experience as a medical officer of health was in the county of Bedfordshire; afterwards he was appointed medical officer to the metropolitan borough of Finsbury. In all these spheres—teaching, authorship, and administration—he showed evidence of unusual ability and was plainly marked out for a high position in the Civil Service. When in 1907, the year in which the system of medical inspection and physical care of school-children was introduced, his appointment as Chief Medical Officer to the Board of Education was announced it was generally felt that the new school medical service could not have a better official head.

This was a period of new beginnings. The Education (Administrative Provisions) Act of 1907 made it the duty of local education authorities to provide for the medical care of school-children, and this was followed by the Mental Deficiency Act and the Act providing for the care of epileptic and other defective children. The National Health Insurance system, which was introduced in 1912, had its indirect effect on the health of the school-child, and there followed developments in the field of maternity and child welfare, the dental service, Poor Law administration, hospital provision and usage, and public health services in general. The war of 1914–18 gave a new impetus to preventive medicine, and the idea of a Ministry of Health to co-ordinate all health work, including maternity services, and to provide guidance and inspiration to local authorities, appeared on the legislative horizon. Meanwhile on Feb. 14, 1919, Dr. Addison, as he was then, President of the Local Government Board, appointed Sir George Newman as Chief Medical Officer of the Board. It was understood that he would retain his position under the Board of Education and that the arrangement marked a further step towards that co-ordination of the public health services which was to be one of the principal objects of the forthcoming Ministry. The post was then a new one, and the holder was to have the status of a secretary of the Board as well as administrative responsibilities for the work of his department. The Ministry of Health was established under the Act passed in 1919. Dr. Addison was appointed Minister in June of that year, and the Ministry took over the functions which had previously fallen to the lot of the Local Government Board and the National Health Insurance Commissions. That great administrator Sir Robert Morant became its Secretary and Sir George Newman its Chief Medical Officer.

While it would be wide of the mark to say that Newman was the instigator of all the various health reforms which preceded and followed the establishment of the Ministry of Health, his genius made itself evident in many directions. Perhaps his mind was interpretative rather than creative. He had an unusual power of awakening public interest in health matters. He was in fact the perfect medical publicist, and he helped more than any other man of his time to make the English people "health-conscious." He had, too, a real enthusiasm for increased knowledge on health matters and a determination to make people understand the facts. Entering the Civil Service at as late an age as 37, Sir George Newman never quite accommodated himself to its practice and traditions, which, with all their virtues and limitations, have meant so much to this country. He was always the medical man rather than the Civil Servant, and the health propagandist above all. If he never fitted into the cadres of Whitehall, his passion for science, his high ideals of citizenship, his alert mind, his ability both to inform those whom he addressed and to move their hearts, were of the greatest value to the nation, especially at a time when public opinion was focused on the "common health," to use the form of toast to which he once responded in a noteworthy speech at a British Medical Association dinner.

Sir George Newman's role as the official head of the health services was as often persuasive as administrative. Many examples of his wise guidance could be cited. One that immediately comes to mind is the list which he issued of the methods of prevention of rheumatism in childhood, a subject that always deeply interested him. A residential school of recovery for rheumatic children, which he first recommended to the Board of Education, was later declared by a special committee of the British Medical Association to be a necessity for every town.

The brilliant series of annual reports issued by Sir George Newman, first as an officer of the Board of Education and later as an officer also of the Ministry of Health, are his abiding memorial. These reports extend from 1908 to 1935. To many secretaries and others the compilation of an annual report is casually undertaken as a sort of appendix to the year's work, but to Newman it was much more. His reports were not merely a record of past or a forecast of future achievement, they were intended to be a kind of serial scripture for those engaged locally in the administration of public health. They had inspirational value, probing into causes as well as describing results, urging ideals as well as advising on methods. To a large extent they were from his own pen. Some parts of them dealing with special subjects were the work of his colleagues, but one could usually detect his own writing from its literary style, and from something more than style, from the warm glow of evangelistic fervour which informed it.

Over and over again in those reports Sir George Newman as the head of the preventive medical services of the country paid tribute to the work of the private practitioner as a pioneer in preventive medicine. In his official position he never failed to appreciate the importance of the family doctor's contribution. He realized that it was upon the general practitioner that the safeguarding of the public health depends, and that it is possible for health departments, both central and local, either to alienate practitioners or to enlist their whole-hearted service. In an annual oration to the Hunterian Society he strongly rebutted the view that the public medical services are designed to exclude the private practitioner. The contrary, he said, was in fact the case, and he pointed to the Poor Law medical service, which had 4,000 medical officers for outdoor medical relief practically all of whom were general practitioners.

Apart from the heavy and constant work which attended his double office Sir George Newman undertook many other important labours. During the war of 1914–18 he was chairman of the Health of Munition Workers Committee, a body which still lives on in the form of the Industrial Health Research Board. Another war activity of his was that of

medical member of the Central Control Board (Liquor Traffic). The many interdepartmental and other committees of which he was a member were concerned with such subjects as playgrounds, reformatories, tuberculosis, medical research, the production and distribution of milk, the registration of dentists, postgraduate medical education, and maternal mortality. He was from 1919 until 1939 Crown Nominee on the General Medical Council, and during the latter part of that time served the Council as Senior Treasurer. Medical education was one of his great interests and the theme of many of his public speeches. He was also medical assessor to the University Grants Committee.

In later years, as became a respected senior and wise counsellor, Sir George Newman was often invited to the lecture desk, a position which he valued and in which he always gave of his best. He was often eloquent in speech and had the power of assembling facts and arguments in an attractive way, though a certain shrillness of voice when he became animated took away a little from the pleasure of his utterance. He gave the Yale lectures in 1927, taking as his subject "Citizenship and the Survival of Civilization." He was Linacre Lecturer in 1928, Gresham Lecturer in 1929, Halley Stewart Lecturer in 1930, when his subject was "Health and Social Evolution," and Heath Clark Lecturer in 1931. The same elevated diction which characterized his orations appears in his published works. In addition to the books already mentioned there appeared in 1919 his *Outline of the Practice of Preventive Medicine*, in 1923 *Recent Advances in Medical Education*, and in 1927 *Interpreters of Nature*. This last work includes some choice essays in which he indulged his love of the history of learning and of medicine. One of them, which he dedicated to St. Bartholomew's, testifies his veneration for the ancient University of Padua. Another is on Thomas Sydenham on the occasion of his tercentenary; another, written for the bicentenary celebration of the Medical Faculty of the University of Edinburgh, is on the disciples of Boerhaave, the Dutch physician. His studies of John Keats, of Louis Pasteur, and of William Osler are excellent of their kind and most readable. In 1941 he contributed a volume on "The English Social Services" to the Britain in Pictures Series. A larger volume on *The Building of a Nation's Health* which appeared in 1939 was the fruit of his leisure after his retirement. In that work the most interesting chapter is a personal one concerning his forceful colleague Sir Robert Morant. It is indeed a fortunate thing that two departments of the Government should have had at a formative period in English social history two such servants as Morant and Newman.

The many honours which were bestowed upon Sir George Newman included the honorary degrees of D.C.L. of Durham and LL.D. of Edinburgh, McGill, Toronto, Glasgow, and Leeds, the Honorary Fellowship of the Royal College of Surgeons of England, the Freedom of the Society of Apothecaries of London, and the Fellowship of the New York Academy of Medicine. He was knighted in 1911, the K.C.B. followed in 1918, and the G.B.E. in 1935. A lifelong member of the Society of Friends, he was for forty years the anonymous editor of the *Friends Quarterly Examiner*.

He married in 1898 the daughter of Samuel Thorp, of Alderley Edge. There were no children of the marriage, and Lady Newman died in 1946.

C. A. RAISON, M.B., F.R.C.S.

We announce with regret the death of Mr. C. A. Raison, the well-known Birmingham surgeon. He died in the Queen Elizabeth Hospital on May 8, at the age of 57, after a long and painful illness.

Cyril Alban Raison received his medical education in the University of Birmingham and qualified M.B., Ch.B. in 1914. After serving as house-surgeon to Prof. Leedham Green, he joined the R.A.M.C. and saw active service in Salonika. He was promoted major and had charge of a surgical division. In 1921 he obtained the F.R.C.S., and in 1928 he became assistant surgeon to the General Hospital, Birmingham. At the time of his death Mr. Raison was honorary surgeon to the United Hospital, and he was also on the staff of the Children's Hospital. He was lecturer in operative surgery in the University and was consulting surgeon to the Nuneaton General and Infectious Diseases Hospital.

In 1939 he volunteered again for the R.A.M.C. He was not accepted, because his health was already impaired. Despite this he continued with his heavy practice and took his full share in the treatment of air-raid casualties in the General Hospital and later on in the nearby underground hospital in the centre of the city.

Raison had a staunch spirit in a slight frame. He was a general surgeon and a strong defender of the genus. Perhaps he would have said that he was trained at a time when a young British surgeon received the finest all-round training surgeons ever have received or ever will. Certainly his large practice and the fact that he was in great demand locally bore testimony to the excellence of his work. He loved his association with the University and with teaching, and gave much time and thought to these matters. There are some men who seem to be part of a medical school. Raison was one of them, probably because he rejoiced to be a part of it. He wrote little, but was sound and thoughtful. He was one of the men who carried on the great traditional teaching of the craft of surgery as it has been carried on since the beginning. It is for this that he will be remembered, and he would have wished for no better memorial.—H.D.

Dr. DAVID STONE, who died at his home in Northampton on April 10, was born in 1865 at Ardochrig Farm, East Kilbride, Lanarkshire. He was educated at St. John's Grammar School, Hamilton, and Glasgow University, where he graduated M.B., C.M. in 1887, proceeding M.D. in 1903. After acting as an assistant in Coatbridge he undertook voyages as ship surgeon to Canada and the U.S.A. and on his return acted as locumtenent in a number of practices before finally settling in Northampton in 1889. There he carried on his own practice until his retirement in 1936. In this year he was made chairman of the Northampton Insurance Committee. Dr. Stone was a keen ambulance worker and lecturer, and was made an honorary serving brother of the Order of St. John of Jerusalem. He was an ardent linguist in both ancient and modern languages, an omnivorous reader, and had a profound knowledge of the Bible. His ministry was most valued among the Open Brethren, with whom he had a lifelong association. His steadfast Christian principles, his unshakable integrity, and the kindliness of his disposition earned for him the respect and love of his fellow townsfolk and patients. His death severs yet another link with a past generation. He is survived by his wife, his son, Dr. Noel Stone, and two daughters.—N.E.S.

Dr. PETER FRANKEL, who died at Colindale Hospital on April 16 at the early age of 33, came to this country from Breslau, Silesia, in 1933. He was the nephew of Dr. Felix Pinkus, the celebrated dermatologist, and was a descendant of the great Ehrlich. He graduated M.B., B.S. as a student of St. Bartholomew's Hospital in 1939. He worked for a time at the British Postgraduate School of Medicine and thereafter took posts in several general hospitals. He proceeded M.D. in 1943, joined the R.A.M.C., and served in Belgium and Germany with the rank of captain. On his return to this country Dr. Frankel obtained the M.R.C.P. and took a temporary appointment at Colindale Hospital. At this time he became engaged to Dr. Diana Owen, who was also resident there. He was appointed registrar to St. John's Hospital for Skin Diseases shortly before his death, which terminated a promising career. A man of wide culture and varied interests, he was always conscientiously concerned with the welfare of his patients. His sincerity and charm of manner, his depth of feeling, coupled with a fine sense of humour, made him always welcome to a wide circle of friends, who deeply mourn his loss. Bernard Shaw once said there are friends who are not taken from us when they die but only when we die. Peter Frankel was such a friend. We offer our deepest sympathy to his mother and sister and his fiancée.—B. W. R.

Dr. GEORGE THOMSON died at the age of 75, on April 16, at the Derbyshire Royal Infirmary. He graduated M.B., C.M. at Aberdeen University in 1894. The village of Codnor, Derbyshire, and the surrounding district mourn his passing. He was medical practitioner there for forty-four years until his retirement in 1945, and he knew them all, even to the second and third generations. He was, moreover, a first-rank medical practitioner, a hard worker, conscientious almost to a fault, and there seemed no limit to his tireless energy. He played a good game of golf and tennis and enjoyed an occasional dance. Yet he found leisure for medical reading and study, and was at all times conversant with the current medical advances in his own field of activity. The writer assisted him for a time over

twenty years ago, and still remembers him as the perfect "chief." The true appreciation of the man, his work, and worth lies deep in the hearts and the memories of the people of Codnor. He was happy among them. The sympathy of their many friends in the profession and outside is extended to Mrs. Thomson and to her two sons, one of whom is in practice in Ripley.—J. M.

Dr. MAUD PATRICIA SMART CLARKE died on April 18 at her home in Prestwich, following a long illness. She was born at Rathgar, Dublin, of Scottish parents. Entering Queen's University, Belfast, she spent three years in classical study before taking up medicine. She graduated in 1930. Her first post was that of house-physician at Forster Green Hospital for Diseases of the Chest, Belfast, and subsequently she was a house-surgeon at Standon Hall Orthopaedic Hospital in Staffordshire. In 1934 she was appointed to the permanent staff of the County Mental Hospital, Prestwich, and had risen to the position of second senior assistant medical officer. As the medical officer for many years to the psychiatric clinic at Oldham Royal Infirmary she established a reputation which the Board of Governors recognized by appointing her to the honorary staff. During the war years Dr. Clarke was commandant and medical officer of the East Lancashire Detachment (298) of the British Red Cross Society, and was subsequently made a life member of the Society. She possessed in outstanding measure those qualities of leadership, loyalty, perseverance, and enthusiasm not often found in one person. Her life was one of service for others. She is survived by her mother and sister.—G. T.

Dr. EDWARD FITZWILLIAMS HOARE, who was coroner for East Sussex for over twenty years, died at Ditchling on May 4 at the age of 71. He was born at Brighton, the son of the Rev. Edward Newenham Hoare, and was educated at the Merchant Taylors' School, Great Crosby, and at Liverpool University and the Rotunda Hospital, Dublin. He took the L.S.A. in 1904, graduated M.B., Ch.B. a year later, and proceeded M.D. in 1908. Dr. Hoare also entered the Middle Temple and was called to the Bar. He practised in Liverpool and Manchester at one time, and some twenty years ago he was appointed coroner for East Sussex. He was chairman of the Court of Referees of the Ministry of Labour for Brighton and Worthing, and acted as medical referee for the same Ministry. He served in the R.A.M.C. during the first world war. Dr. Hoare had been a member of the B.M.A. for many years, and was an honorary life member of the St. John Ambulance Association. He wrote but seldom, and the few articles he contributed to the medical press dealt with subjects connected with his daily work, for example, "Post-mortems, their Object, Time, and Place," and "Preventable Accidents." He died in harness. After conducting an inquest at East Grinstead on Monday, May 3, Dr. Hoare complained of feeling unwell. He was taken to his home at Ditchling, where he died the following morning. He was a quiet-voiced man, always courteous and considerate to relatives, but conducting his investigations with detailed thoroughness. He was one of the first coroners to use the words "while the balance of the mind was disturbed" instead of "while of unsound mind." As an example of his meticulous observation of the proper procedure, it is told that on one occasion when his son was before him as a witness he was solemnly asked by his father for his name and address. At the cremation ceremony at the Downs Crematorium, Brighton, on May 7, many representatives of public bodies, including various sections of the Police Force, and many of his colleagues and friends were present. Dr. Hoare left a widow and a son, a medical man, Dr. Ashley Hoare, to whom his professional brothers extend their sympathy.—L. A. P.

Dr. JOHN MACINTYRE died at his home in Lanark on May 11. A native of Coatbridge, he entered the Church of Scotland Training College, Glasgow, in 1896 with a Queen's scholarship, and after his period of training there taught for two years as an assistant master. He took up the study of medicine at Glasgow University in 1900 and graduated M.B., Ch.B. in 1905. He went on to take the D.P.H. after four years in general practice. He was then appointed school medical officer for the County of Lanark and later became deputy county medical officer. During the 1914–18 war he served with the R.A.M.C. in France, Macedonia, Italy, and Belgium. Dr. Macintyre in the course of his work in Lanark undertook a number of investigations on the health of school-children. In 1929–30 he conducted a milk-feeding experiment and arranged for 10,000 of the county's school-children to receive a special daily ration of milk. His findings were published in the form of a special report which exercised its effect when the present "milk in schools" scheme was being established by the Government.

Dr. MAURICE WAUGH RENTON died at his home in Dartford on May 19. He was born in Macduff, Banffshire, and educated at Marischal College, Aberdeen University, and at the London Hospital. He graduated M.B., C.M. in 1893, proceeded M.D. in 1906, and took the D.P.H. two years later. Dr. Renton went to Dartford in 1903 after the Boer War, when he served with the South African Field Force and was mentioned in dispatches. He again saw service in the first world war, when he was surgeon in charge of the British Hospitals Formation with the Tenth French Army. Dr. Renton was a forceful character, a man of outstanding personality and ability, courageously impulsive, a staunch individualist, and a great fighter for his own rights and those of the ordinary man. He firmly believed that everyone should have a fair chance, and pursued this principle steadily. To Dartford people Dr. Renton was well known as the leading medical practitioner of the town and also for his surgical work in connexion with the Livingstone and the County Hospitals. He belongs to that brand of pioneers who through public spirit and foresight used their knowledge and skill to transform Poor Law infirmaries into sound general hospitals. Dr. Renton was for nearly fifty years a prominent member of the British Medical Association, serving on many of its committees. He was president of the Kent Branch in 1928, and on thirteen occasions between 1919 and 1939 represented his constituency at the Annual Representative Meeting. He took an active interest in politics, was a life-long Liberal, and was at one time president of the Kent Liberal Association. After his retirement as medical superintendent he gained election to the Kent County Council. Although he retired from general practice in 1940, he continued until 1945 his work as honorary consultant surgeon to the Livingstone and the County Hospitals and as chairman of the medical recruiting board at Chatham. Dr. Renton won an enduring place in the memory and affection of a large circle of friends and of thousands of patients who readily placed their faith in his skill and wisdom. His sterling qualities and forthright character and personality will be sadly missed. His record of public service, however, is being ably maintained by his son, Mr. David Renton, M.P. The sympathy of his colleagues and of his many friends and patients will be offered to his widow and son.—T. S. C.

Dr. D. W. Standley writes: Dr. Renton was closely associated with the work of two local hospitals for over forty years. He inspired his colleagues and civil authorities alike with faith in his capacity to raise the status of the hospitals he was connected with, and was ceaselessly eager that any of his colleagues who wished to participate by direct contact in the facilities for self-improvement available only in hospitals should be able to do so. He was a believer in team work, and strongly felt that the advantages he himself derived from hospital work should be shared by others who sought them. He was always anxious to foster good relations among medical men practising in his district, not only socially but also in the sphere of their professional activities. The benefit of his long practical experience was always within reach of anyone who needed it. To many of his colleagues and indeed to a large number of the inhabitants of Dartford the news of his death must have brought a sense of personal loss.

Medico-Legal

FEES OF A NURSES' AGENCY

[FROM OUR MEDICO-LEGAL CORRESPONDENT]

By the Nurses Act, 1943, a person carrying on an agency for the supply of nurses must obtain a licence from the local authority. The authority may impose such conditions as they may think fit for securing the proper conduct of the agency, including conditions about the fees to be charged the nurses or the clients by the licensee. The Middlesex County Council, in licensing the agency conducted by Mr. Lewis Miller at Golders Green, imposed a maximum fee chargeable to a patient, regardless of whether the nurse was willing to work for that sum or not. Mr. Miller appealed to the Middlesex justices, who held that the condition was *ultra vires* of the Act.[1] The Council appealed, and the High Court agreed with the justices.

Lord Chief Justice Goddard referred to the finding of the Bench that agencies for the supply of nurses could be divided into three categories. In the first the agency employed the nurses, paid them a salary, and let them out as its servants to the patient. In the second the nurses collected their own fees and paid the agency a commission. In the third, which

[1] *British Medical Journal*, 1947, **1**, 548.

included Mr. Miller's firm, the agency found employment for nurses at the salary which the nurses required. Mr. Miller introduced the nurses to the patient, rendered the accounts to the patient, collected the sum due, and paid it to the nurse after deducting 10% commission. The Council conceded that there was nothing wrong in an agency supplying nurses on the basis that they made their own bargains, nor in a nurse supplied at the Council's maximum rate making some additional bargain with the patient and recovering some extra money. As the court pointed out, if the nurse would not work for the maximum fixed by the Council, the curious position would be reached that the patient would have to pay one sum to the agency and another to the nurse. In the view of the court this was not a condition for securing the proper conduct of the agency. The provision in the Act was aimed at undue fee-snatching : it had often been found that unscrupulous agents charged excessive fees and prevented people from getting proper employment unless they paid such fees or imposed on their employees improper or undesirable terms. If, however, a nurse demanded, say, seven guineas a week and the agent told the patient that that was the charge, that was perfectly proper conduct by the agency. Mr. Justice Singleton agreed that the condition objected to was not in any sense necessary for securing the proper conduct of the agency but went outside anything of the kind. The court therefore upheld the justices' decision that the maximum fee in this licence was invalid.

The issues in this case affect about 20,000 nurses, half of them in London.

Universities and Colleges

UNIVERSITY OF CAMBRIDGE

The following degrees were conferred on May 15.

M.CHIR.—L. L. Bromley.
M.B., B.CHIR.—*M. T. Gillies, *H. W. H. Kennard.

* By proxy.

UNIVERSITY OF LONDON

The following candidates have been approved at the examination indicated :

THIRD M.B., B.S.—[1 3 5]P. Freedman, [1 5]Aileen M. Hampton, [1 5]L. A. Hatch, [1 3]E. T. Hughes, [1 7]Catharine E. Large, [1 4 7]F. H. Lumb, [1 4 7]G. C. Mathers, [1 4]H. W. Matthews, [1 5]C. P. Mills, [1 5]G. R. J. Moodie, [1 5]P. R. B. Noel, [1 3 4]L. J. Rubinstein, [1 3]D. B. Stone, [1 2 6]Elizabeth K. Tang, [1 6]N. L. Teck-Kam, [1 6]L. J. Temple, [1 3 6]J. W. Thompson, [1 5]A. W. R. Williamson, R. C. P. Aldridge, J. G. U. O. Alexander, D. B. Allbrook, J. A. S. Amos, K. Anderson, W. McC. Anderson, D. R. Bangham, Anne L. Barlow, Audrey Beder, R. C. T. Bellamy, Nancy L. C. Berry, J. Bihari, G. L. Blewett, A. S. Bligh, Barbara A. Boodson, Joan M. Bremner, D. S. N. Brierley, C. O. S. B. Brooke, A. E. Brown, W. W. Bryett, J. P. Bush, R. St. J. Buxton, A. R. P. Calder, Dorothy B. D. Callander, Pamela H. Canham, Jill C. Clark, J. Clark, Jeanne M. Clements, K. W. Colebourne, R. O. N. G. Colley, A. W. Cook, M. H. D. Cooper, Kathleen Corbishley, E. L. Corsi, R. S. C. Couch, L. Coueslant, L. A. Cruttenden, A. P. Curtin, Phyllis Dagnall, Brenda M. Davies, H. E. F. Davies, R. L. G. Dawson, J. V. Deakin, H. R. De Vitre, B. P. Doyle, P. H. Drake, C. J. Earl, C. N. d'E. Eastes, M. W. Eddings, P. W. Edward, V. G. Edwards, S. E. Ellison, P. F. Eminson, A. B. A. Evans, D. K. Evans, P. A. Eyre, B. Fairburn, D. D. Felix-Davies, O. D. Fisher, P. R. Fleming, D. D. Forbes, Marv E. Forrester, Veronica M. Gammon, P. H. Garrard, B. A. Gavourin, S. S. B. Gilder, T. W. A. Glenister, J. Ll. Goodger, Jeanie F. Gordon, P. R. Harben, G. Harris, R. H. Harris, Pamela N. Harris-Wright, R. T. T. Harrison, T. G. Harvey, M. C. Head, C. E. D. Hearn, H. Herbert, D. W. Hill, H. W. Holland, P. W. T. Hollis, M. C. Holtby, Annie Hosker, A. C. Hume, V. E. Ireland, H. M. R. James, Rosalind E. S. James, Nancy C. Janes, J. W. G. Johnson, Millicent M. Johnston, H. E. Kane, H. Keen, K. J. Kingsbury, J. E. H. Lahaise, J. M. Ledingham, A. L. Levene, M. J. Livera, E. C. Livingston, D. Lonsdale, K. N. H. Low, R. W. Lyle, Flora Macdonald, I. L. Macfarlane, Elizabeth A. Martin, M. J. May, W. E. Medd, R. A. Miller, E. R. Mitchell, J. C. Mitchell, P. R. Morgan, H. S. Moore, Jean M. Moore, B. J. Ll. Moss, R. J. Moylan-James, A. C. Mulvaney, R. H. P. Oliver, B. C. H. O'Neill, B. D. Orr, J. T. Owen, Margaret G. Oyston, D. L. Palmer, J. D. K. Palmer, D. S. Parken, D. J. Parr, G. R. Parry, R. A. Payne, Winifred I. Pearce, J. R. B. Peckover, C. I. G. Phillips, R. S. Pine, A. J. Popert, K. A. Porter, J. R. Prentice, A. V. Price, Jean M. Randall, M. W. Reece, E. R. Reid, Joan Rendall, T. W. Renton, P. G. Roads, W. D. V. Roderick, J. Roper, I. R. L. Rose, O. T. Samani, D. E. G. Sayers, L. Schaffer, R. Schwinger, Una Scorer, H. M. G. Shanly, P. A. Shave, D. J. Sheerboom, J. G. H. Sheppard, J. H. Sherrey, R. G. Shorter, B. J. Silkoff, K. Simpson, C. W. Smith, R. A. G. Smith, E. S. Snell, R. J. Sollars, G. F. Spaul, B. J. Stephens, N. A. Stephens, D. C. Stevenson, J. A. Stewart, L. V. Sthyr, J. A. Sutton, F. Taylor, P. B. J. Taylor, N. B. Thadani, J. M. Thompson, Valerie M. Thompson, E. W. Thurston, P. Timmis, G. C. Turle, W. C. Turner, A. E. P. Twort, Betty M. L. Underhill, J. A. Vyse, N. H. Warburton, J. W. Watson, L. A. Watson, P. S. Watson, A. B. Wayte, K. F. Weeks, M. M. Whiteley, D. A. G. Williams, H. G. Williams, Betty M. Winterbotham, L. P. J. Wright, D. E. Yates.

[1] With honours. [2] Distinguished in pathology. [3] Distinguished in hygiene and forensic medicine. [4] Distinguished in medicine. [5] Distinguished in applied pharmacology and therapeutics. [6] Distinguished in surgery. [7] Distinguished in obstetrics and gynaecology.

HUNTERIAN TRUSTEES

A meeting of the Hunterian Trustees was held at the Royal College of Surgeons of England on May 12 with the Earl of Athlone in the chair. Others present were Sir Alfred Webb-Johnson, Bt., President of the Royal College of Surgeons of England, Sir Arthur Keith, F.R.S., Sir Holburt Waring, Mr. R. H. Burne, F.R.S., Prof. Matthew J. Stewart, Viscount Leverhulme, Prof. F. Wood Jones, F.R.S., Sir Frank Colyer, Prof. H. A. Harris, Sir Adolphe Abrahams, and Dr. E. Bellingham Smith.

The Trustees inspected the surviving parts of the Hunterian Collection, once more on exhibition in the museum. They also approved the plans for rehousing the Collection in the new museums which are to be built to replace those destroyed by enemy action.

Medical Notes in Parliament

The Mental Treatment Rules, 1948, and the National Health Service (Emergency Mental Treatment) Regulations, 1948, were presented to Parliament on May 25. On the same date the Report to the Lord Chancellor on the number of visits made and patients seen by the Visitors of Lunatics between Oct. 1, 1947, and March 31, 1948, was laid on the Table.

The Mental Treatment (Adaptation of Forms) Rules, 1948, were presented to Parliament on May 26.

NATIONAL HEALTH SERVICE

On May 27 Mr. PETER FREEMAN asked whether the Minister of Health would provide for a reduction or abolition of premiums to the National Health Service where no claim had been made after a period of years in order to discourage frivolous applications and encourage personal responsibility for good health.

Mr. BEVAN, in reply, said the National Health Service was free to all and there were no premiums of any kind. The benefits available did not include cash benefits, which were provided under the National Insurance Act.

Answering Colonel STODDART-SCOTT, Mr. BEVAN said a relatively small part of the cost of the National Health Service was met by a grant from the National Insurance Fund. This grant would not be allocated to any particular part of the Service. As there would be persons eligible for the full benefits of the Health Service, although they made no contributions, the Service obviously was non-contributory. Colonel Stoddart-Scott suggested that as on July 5 Mr. Bevan was not going to provide the service laid down in the Act, he should advise his colleagues to reduce the weekly contributions of 8d. or 10d. which every member was asked to pay toward the Health Service.

Mr. BEVAN told Mr. COLLINS on May 27 that he accepted in principle the recommendations of the Committee on the Remuneration of General Dental Practitioners. Discussions were about to take place with representatives of the dental profession and he hoped to reach a speedy conclusion on the detailed application of these recommendations.

RADIOACTIVE SUBSTANCES BILL

On May 28 Mr. ANEURIN BEVAN moved the Second Reading of the Radioactive Substances Bill, the purpose of which, he said, was to secure protection for the health of workpeople and of the public against the harmful effects of exposure to dangerous radiation. He said the safety code of the *X*-ray and Radium Protection Committee, which was appointed about twenty-five years ago by the Medical Research Council, was not always observed. The need for the Bill was greater because the country was on the verge of a vastly extended use of radioactivity. The power of the apparatus used and the quantity of radioactivity available had increased enormously. There was under construction in this country a cyclotron which would give 300,000,000 volts. In medicine *x*-ray apparatus had reached 250,000 volts and betatrons might shortly be used giving 30,000,000 volts. Artificial radioactive substances were becoming freely available for therapeutic use. All had different rates of emission and were difficult to define. This difficulty had led to the unusual structure of the Bill. The relatively cheap rates at which many of these products might be available would mean that, unless they were restricted in their use, untrained people might do themselves great damage. The effects of exposure to radioactive substances of high emission rates were often insidious and the consequences known only after a number of years. Therefore experts advised that it was necessary to provide for the protection of the public. Safeguards had been introduced into this Bill which had not been present in the Bill which was introduced a year ago. The present Bill had been discussed in the House of Lords and he believed it could

be treated as an agreed measure. After outlining its provisions Mr. Bevan said the Bill gave the Minister unusual powers, many of which were novel. It was an enabling measure to enable the Minister concerned to lay down Regulations with a particularity which could not be attempted in a Bill. That these powers should not be subject to abuse, a powerful advisory committee was to be appointed. Bodies who would be asked about the appointment of representatives included the Medical Research Council, the three Royal Medical Colleges, and the Royal Medical Corporations of Scotland. He laid emphasis on the protection of the population from the commercial exploitation of radioactive substances put into soap, face-cream, lipsticks, and that sort of thing.

Special Powers

Mr. RICHARD LAW said Mr. Bevan had established the case for the Bill. If these substances were to be controlled and individuals protected from them, the special powers asked by Mr. Bevan were necessary. Nevertheless dangers arose from these great powers. Clause 5 might produce stagnation in scientific research and development. The powers might be used to give an advantage to one section of the medical profession over another. The radiologist or the radiotherapist might be given a corner in this field. Dermatologists had long used methods of radiotherapy and were afraid some monopoly might be set up to their disadvantage. All these dangers would be averted if the Advisory Committee did its work properly. He asked whether the Committee could initiate advice as well as give it when asked.

Mr. BEVAN said he would see the Bill was, if necessary, amended so that advice could be given over the whole field.

Mr. LAW said it was desirable that the Advisory Committee should give the Ministry of Supply advice on the allocation of the costly and scarce tracer materials which were produced at Amersham.

Major VERNON said many radioactive materials had a short half-life. Preparations of them must be kept under control hour by hour until used. The phrasing of the Bill did not fit that process. The customary training of medical practitioners and dispensers did not fit them for this work. It seemed dangerous for the Bill to propose that when a person applied for a licence, that licence should be granted automatically for three months before a scrutiny was made. Disposal of waste was a difficulty. Laboratories had become radioactive to such an extent that they had to be abandoned. The precautions taken at Harwell were excellent, but some other establishments had not been so thorough in the past.

Mr. SOMERVILLE HASTINGS said that forty years ago he had been casualty officer in a teaching hospital when *x* rays were a new toy and their dangers were not appreciated. The doctor and technician who then worked with him died of *x*-ray cancer. The effects of exposure might become apparent many years afterwards. Therefore he welcomed the Bill. He asked whether the persons who used *x* rays daily in boot shops were sufficiently protected. He was afraid that the doctors on the Advisory Committee might to too large an extent be specialists. He asked Mr. Bevan to include in that Committee ordinary physicians and surgeons and perhaps a few dermatologists as well.

Mr. HAROLD DAVIES asked if there was a guarantee that no radioactive effluents could get into the rivers and into the drinking water.

Mr. BLACKBURN said no case had occurred of anyone being injured at Harwell by radioactive substances. The Bill should have been introduced long ago. In New York six corporations distributed radioactive substances for medicine and industry. In that development Britain was four or five years behind. He hoped the Government would let the Dominions receive supplies of radioactive isotopes.

Mr. BEVAN said that nothing in the Bill prevented dermatologists being placed on the Committee. When the Bill said that radioactive substances, as defined by Regulations, could only be prescribed by duly qualified doctors and dentists, "duly qualified" meant those persons designated by the Advisory Committee. The normal curriculum of the ordinary doctor did not cover the facility to use these substances. That had been recognized by all the learned bodies concerned. He assured Mr. Davies that there was no danger of contamination of water supplies.

The Bill was read a second time without a division.

CIVIL SERVICE ENTRANTS

In the House of Lords on May 26 Lord MERSEY drew attention to remarks attributed to Sir Percival Waterfield, the first Civil Service Commissioner. Sir Percival was reported to have said at Oxford that of 3,000 men and women graduates interviewed for the Civil Service, 40% of those who desired to go into the administrative service and 50% of applicants for foreign service scored marks for personality and intelligence which represented complete failure. Among those who failed, 60% had University or College scholarships and 20% had State scholarships. He asked whether the Government suggested any alterations in the present system.

Lord SIMON OF WYTHENSHAWE said he had spent forty-eight hours at Stoke d'Abernon and had witnessed the tests of civil service entrants. [These tests are the subject of an article which appears at page 1094 of this issue.] He explained the system of grading candidates and said the science of interviewing was changing rapidly. Large industrial firms were beginning to adopt CISSB methods. Prejudice had been imported into the matter because of the practice of having a professional psychologist as one of the three interviewers. The Civil Service Selection Board was trying to understand the mental characteristics of individuals and estimate how they were likely to develop. That was not a job to be left to amateurs. The only way one could judge was by seeking the help of a psychologist.

Lord LINDSAY of BIRKER said Sir Percival Waterfield had not spoken about the CISSB. He was talking about the distressingly low standard of qualities shown by candidates who came before the Board. Lord Lindsay said that in his own experience in Oxford at the beginning of the war he saw the whole of the candidates for the University and was struck by the fact that a small number of boys, mostly State scholars, were no good at all. Their health was hopeless, they had no physique, and they made one despair. They were able boys from poor homes and small schools for whom a State scholarship meant everything. Competition for the scholarships had ruined their health and usually ruined their minds.

Lord MORAN, referring to psychological tests in the Services during the war, said it was not so much that psychology was in its infancy as that a few of those practising it were in their dotage. If the failures to which the first Civil Service Commissioner had referred were chiefly in the personality tests, it was necessary to remind the House that these tests of personality had never been validated in peace or war. He thought the majority of candidates seemed convinced that the Stoke d'Abernon week-end was far fairer than the short interview given in the past.

Other Methods of Selection

Lord ELTON believed that the traditional tests for the Civil Service were over narrow in that they confined themselves to selecting persons likely to absorb readily and reproduce lucidly the ideas of other people. In the traditional examinations the successful candidate needed to possess neither common sense nor honesty, neither courage nor adequate physique, nor even an original mind. The selection of Rhodes scholars without any form of written examination was simpler than the CISSB arrangements and had been extremely successful. Statistics in the United States which compared the careers of one hundred Rhodes scholars with a hundred persons possessing the highest intelligence quotient were markedly in favour of the Rhodes scholars. He had been in the United States, Canada, and Rhodesia and had met some hundreds of members of the Selection Committees for Rhodes scholarships. Almost without exception these men greeted the suggestion with horror and apprehension. He himself suspected that psychology was making exaggerated claims.

Lord PIERCY said the tests at Stoke d'Abernon were as complete as possible and in addition every available piece of information about the candidate was carefully scrutinized. The psychologists were fundamental to the whole system. They provided and often devised the techniques. No system at present devised could be 100% perfect, but the selection of officer candidates during the second world war was done with an impressive margin of superiority over all other methods by similar procedures in which selection groups used the psychologist and in the case of the War Office the psychiatrist also. The National Institute of Industrial Psychology, which had specialized for twenty-five years in procedures for vocational selection, had supplied psychologists to the Admiralty and the War Office and to the Manpower Planning Department. The three psychologists at Stoke d'Abernon were all former members of the Institute's staff. A number of big firms, including Unilever, Imperial Chemical Industries, and the Phillips Electrical concern selected their intake of new people by these group procedures.

Lord CHERWELL repudiated the idea that the average mental level of students was lower than before or that the Universities were selecting the wrong people and training them wrongly, or that the old-fashioned methods of entry to the Civil Service by competitive examination should be superseded by the impressions of psychiatrists and professional interviewers.

Lord PAKENHAM, replying for the Government, said the reconstruction examinations or competitions had been required

to bridge the gap created by the war, and the candidates were between 21 and 31 years of age. Whatever the test applied to them it would be unscientific to try to make a comparison between their quality and the quality of the candidates before the war. But the essential fact was that in spite of war losses and interruptions the Civil Service could still find as many top-quality candidates as before the war. The psychologists at CISSB were experts in normal psychology and not specialists in handling the morbid or neurotic. The verdict of the Government was that CISSB was serving admirably the purpose for which it was intended. The week-end scrutiny tested mental ability with more emphasis on speed and practicality than did a written examination. It also threw some light on moral character. The Government were taking the wise course of trying out both systems.

Paper for Books.—Mr. BOTTOMLEY said on May 27 that there was no joint reserve of paper for export and educational books. Under the arrangements at present in force publishers were allowed paper to the extent of 60% of their pre-war consumption and were required to maintain the same proportion of educational books as hitherto. They were allowed a further 20% which must be used only for educational books or books for export. In addition, there was a special reserve of paper for educational and other important books which would not otherwise be produced from the publishers' quotas, and a second and separate reserve for export books. He was satisfied that under these arrangements no important educational books need be held up for lack of paper.

V.D. in R.A.F.—Mr. ARTHUR HENDERSON denied, on May 26, that any order had been issued at a conference at H.Q. 85 Wing B.A.F.O., in November last that medical officers who found members of the Forces suffered from V.D. should divulge their names and the nature of their disease to the commanding officer of the unit.

EPIDEMIOLOGICAL NOTES

Discussion of Table

In *England and Wales* the only changes of any size in the returns of infectious diseases were increases in the notifications of measles 1,723, acute pneumonia 102, and scarlet fever 97.

The largest increases in the notifications of measles were Warwickshire 396, Essex 267, Surrey 236, Lancashire 174, and London 104. The incidence of pneumonia rose slightly throughout the northern section of the country, except in Durham; the largest rise was 37 in Yorkshire West Riding. The largest fluctuations in the trends of scarlet fever were rises in London 41 and Lancashire 31.

A rise of 10 in the notifications of diphtheria occurred in Lancashire. The only large change in the local returns of whooping-cough was an increase of 63 in Warwickshire.

The chief centres of dysentery were Yorkshire West Riding 33 (Bradford C.B. 14, Sheffield C.B. 17); London 24 (Kensington 10); and Lancashire 18. Notifications of poliomyelitis exceeded the total of the preceding week by 10, and multiple cases were notified in Lancashire 3, Bedfordshire 2, Durham 2, Leicestershire 2, and Warwickshire 2.

In *Scotland* there was a small rise in the notifications of most infectious diseases; the increases included scarlet fever 34, acute primary pneumonia 28, diphtheria 13, and dysentery 10. The rise in the incidence of dysentery was due to the experience of Glasgow, where the cases rose from 28 to 40. The increase in the notifications of other infectious diseases was fairly generally distributed throughout the country.

In *Eire* large increases were reported in the incidence of whooping-cough 74 and measles 61. The largest returns of whooping-cough were Clare, Kilrush R.D. 35, and Dublin C.B. 31. The largest centres of measles were Dublin C.B. 41, Wexford, Wexford U.D. 30, and Monaghan, Monaghan U.D. 18.

In *Northern Ireland* the notification of measles in Belfast C.B. were 22 fewer than in the preceding week. The notifications of scarlet fever increased by 11 as a result of a small general rise in the incidence of this disease.

Week Ending May 22

The notifications of infectious diseases in England and Wales during the week included: scarlet fever 1,354, whooping-cough 2,680, diphtheria 168, measles 11,677, acute pneumonia 628, cerebrospinal fever 48, acute poliomyelitis 20, dysentery 118, paratyphoid 8, and typhoid 6.

No. 20

INFECTIOUS DISEASES AND VITAL STATISTICS

We print below a summary of Infectious Diseases and Vital Statistics in the British Isles during the week ended May 15.

Figures of Principal Notifiable Diseases for the week and those for the corresponding week last year, for: (a) England and Wales (London included). (b) London (administrative county). (c) Scotland. (d) Eire. (e) Northern Ireland.

Figures of Births and Deaths, and of Deaths recorded under each infectious disease, are for: (a) The 126 great towns in England and Wales (including London). (b) London (administrative county). (c) The 16 principal towns in Scotland. (d) The 13 principal towns in Eire. (e) The 10 principal towns in Northern Ireland.

A dash — denotes no cases; a blank space denotes disease not notifiable or no return available.

Disease	1948 (a)	(b)	(c)	(d)	(e)	1947 (Corresponding Week) (a)	(b)	(c)	(d)	(e)
Cerebrospinal fever	36	2	21	2	—	57	3	37	—	2
Deaths		1	—				2	—		
Diphtheria	153	14	57	10	3	243	23	66	15	3
Deaths	1	—	—	—	1	—	—	1	—	—
Dysentery	111	24	59	—	—	65	8	9	—	—
Deaths				—	—				—	—
Encephalitis lethargica, acute	2	—	1	—	—	2	—	1	—	—
Deaths		—					—			
Erysipelas			30	8	1			41	3	—
Deaths		—					—			
Infective enteritis or diarrhoea under 2 years				18					33	
Deaths	30	3	9	6	1	80	7	15	3	3
Measles*	11,879	1040	202	177	68	12,678	532	186	82	14
Deaths†			2	1	—	8	—	—	—	—
Ophthalmia neonatorum	46	7	9	—	—	85	10	19	2	—
Deaths										
Paratyphoid fever	7	—	—	—	—	3	—	—	—	—
Deaths	—	—	—	—	—	—	—	—	—	—
Pneumonia, influenzal	611	30	2	5	5	578	36	3	6	5
Deaths (from influenza)‡	7	1	1	—	—	11	3	—	1	—
Pneumonia, primary			219	29				180	27	
Deaths	169	28		14	10		30		9	12
Polio-encephalitis, acute	2	1				—	—			
Deaths							—			
Poliomyelitis, acute	19	—	2	1	—	11	—	1	1	—
Deaths§	—	—					—			
Puerperal fever		—	5		—		1	15		—
Deaths										
Puerperal pyrexia‖	101	5	2	—	—	139	8	11	3	—
Deaths		1					—			
Relapsing fever	—	—			—	—	—			—
Deaths										
Scarlet fever	1,675	134	283	47	45	1,028	91	146	34	41
Deaths†			—	—	—	—	—	—	—	—
Smallpox	—	—	—	—	—	12	1	—	—	—
Deaths				—	—				—	—
Typhoid fever	6	—	—	3	—	9	2	—	1	—
Deaths	—	—	—	—	—	—	—	1	—	—
Typhus fever	—	—	—	—	—	—	—	—	—	—
Deaths				—	—				—	—
Whooping-cough*	3,117	217	45	124	15	2,120	263	231	63	20
Deaths	9	3	—	2	1	11	1	6	3	2
Deaths (0–1 year)	276	41	62	25	10	413	52	74	26	18
Infant mortality rate (per 1,000 live births)										
Deaths (excluding still-births)	4,431	688	581	178	131	4,445	669	597	195	113
Annual death rate (per 1,000 persons living)			11·7	11·1				12·4	12·3	
Live births	8,504	1344	1107	471	247	10,140	1606	1203	434	303
Annual rate per 1,000 persons living			22·3	29·5				24·2	27·4	
Stillbirths	217	42	28			270	41	34		
Rate per 1,000 total births (including stillborn)			25					27		

* Measles and whooping-cough are not notifiable in Scotland, and the returns are therefore an approximation only.

† Deaths from measles and scarlet fever for England and Wales, London (administrative county), will no longer be published.

‡ Includes primary form for England and Wales, London (administrative county), and Northern Ireland.

§ The number of deaths from poliomyelitis and polio-encephalitis for England and Wales, London (administrative county), are combined.

‖ Includes puerperal fever for England and Wales and Eire.

Medical News

Lord Horder and Individual Freedom

Lord Horder was the principal speaker at a lunch given by the Society of Individualists on May 20. Sir Ernest Graham-Little introduced him after reviewing briefly State health services in other countries and pointing out how in many places the Acts had died because of the doctors' refusal to work them. Lord Horder began by saying that he had heard from a friend that Mr. Bevan called him a romanticist. He believed that a few years would show that he was in fact a realist. A few weeks ago the doctors had had the ball at their feet; the Minister had been anxious as a result of the February plebiscite; but the ball had been passed to the other side. Although the doctors had not won their fight they had not lost it, and he himself would persist in the struggle. Unfortunately there were a few people who would sacrifice liberty for security. The doctors had been outwitted by a political manœuvre; they had been given an assurance—a verbal one—that they would not lose their liberty—all at once. But the Minister of Health had power to turn the screw; there was a terrific concentration of power in the Minister's hands.

Referring to Sir Ernest Graham-Little's remarks on how medical Acts elsewhere had become dead letters, he pleaded, "Let us not have a law that nobody pays any attention to." So long as the Minister had such a stranglehold he could not agree that we had won a great victory. Some of his colleagues were signing on the dotted line because they considered the Government had changed its intention. He did not think it had. The Socialist Party's aim remained as originally defined—the medical profession must be organized as a full-time salaried service. He concluded by quoting Prof. Armstrong as saying that the biggest struggle in post-war days was the struggle for individual freedom—the kernel of democracy.

Institute of Orthopaedics

Prof. H. J. Seddon, D.M., F.R.C.S., has accepted the invitation to become Director of Studies of the Institute of Orthopaedics, and Clinical Director of the Royal National Orthopaedic Hospital, 234, Great Portland Street, London, W.

Society of Anaesthetists

A meeting of the Society of Anaesthetists of the South-western Region was held at Cheltenham on April 2 and 3. Dr. Geoffrey Organe was the principal guest, and he gave an interesting address on "The G.P. in the Anaesthetic Service of the Future." Various types of anaesthesia were demonstrated and discussed at Cheltenham and Gloucester. The next meeting will be held at Torquay on June 25 and 26. Anaesthetists from other parts of the country will be welcome. Particulars may be obtained from Dr. G. L. Feneley, 8, Parry's Lane, Bristol, 9.

Imperial Cancer Research Fund

At a meeting of the council of the Imperial Cancer Research Fund, held on May 25, Prof. H. R. Dean, D.M., F.R.C.P., was re-elected chairman of the council for the ensuing year, and Sir Alfred Webb-Johnson, Bt., P.R.C.S., was elected a Life Governor in recognition of his distinguished services to the Fund. It was reported that Lord Amulree, M.D., F.R.C.P., had been appointed an elected member of the council by the Governors in general meeting. Dr. L. Foulds was re-elected Elizabeth Wills Allen Fellow and Dr. Beatrice D. Pullinger was re-elected Alice Memorial Fellow.

Czechoslovak Medical Delegation

A delegation of nine Czechoslovak medical specialists arrived in London on May 26 for a week's visit at the joint invitation of the British Council and the Royal Society of Medicine.

Catholic Women Doctors

Accommodation is available for Catholic lady doctors attending the B.M.A. Meeting in Cambridge from June 25 at the Convent, Lady Margaret House, 12, Grange Road, Cambridge.

Convalescent Home for Epileptics

A small convalescent home for epileptics has just been opened in one of the more remote parts of the Ashdown Forest. Patients of either sex over the age of 16 are eligible. Inquiries and applications should be addressed to the National Association for Mental Health, 39, Queen Anne Street, London, W.1.

Wills

Sir Frederick Gowland Hopkins, O.M., F.R.S., left £13,908. Mr. Frederick François Burghard, formerly consulting surgeon to King's College Hospital, London, left £75,771. Mr. Walter Rowley Bristow, formerly orthopaedic surgeon to St. Thomas's Hospital, left £98,608.

COMING EVENTS

The Institute of Almoners

An extraordinary general meeting of the Institute of Almoners (Tavistock House (North), Tavistock Square, London, W.C.1), will be held at the Midland Hotel, Manchester, to-day, Saturday, June 5, at 2.30 p.m., when there will be an informal discussion on "July 5 and After" to be opened by Miss M. J. Roxburgh (teaching hospital), Miss J. M. Beaumont (municipal hospital), and a speaker from a public health department. After the business meeting Dr. Mary D. Sheridan will speak on "The Deprived Child."

William Withering Lectures

Prof. John F. Fulton, M.A., M.D., Ph.D., Head of the Department of Physiology, University of Yale, will deliver the William Withering Lectures in the Anatomy Theatre of the Medical School, Birmingham, on Monday, Tuesday, Wednesday, and Thursday, June 7, 8, 9, and 10, at 4 p.m. each day. His subject is "Functional Localization in the Frontal Lobes and Cerebellum, with Particular Reference to the Operation of Frontal Leucotomy." Members of the medical profession and students of medicine are invited to attend the lectures.

Research Defence Society

The annual general meeting of the Research Defence Society will be held at 26, Portland Place, London, W., on Tuesday, June 8, at 3.15 p.m., when the Seventeenth Stephen Paget Memorial Lecture will be delivered by Prof. P. A. Buxton, F.R.S., entitled "Tsetse Flies and the Development of Africa."

Faculty of Radiologists

The annual meeting of the Faculty of Radiologists will be held at Cardiff on Friday and Saturday, June 11 and 12. The programme is as follows: At Cardiff Royal Infirmary, June 11, 9.45 a.m., meeting of Fellows; 10 a.m., annual general meeting and admission of Fellows; 11 a.m., meeting of Diagnosis Section, discussion on "Pneumoconiosis in South Wales," to be opened by Prof. Jethro Gough, Dr. C. M. Fletcher, and Dr. L. G. Blair. A demonstration of apparatus will be given and pathological specimens shown to the Therapy Section; 2.15 p.m., meeting of Therapy Section, discussion on "The Treatment of the Leukaemias," to be opened by Dr. R. Bodley Scott, Dr. H. B. May, and Dr. J. S. Fulton. A demonstration on pneumoconiosis will be given before the Diagnosis Section; 7 for 7.30 p.m., dinner at the Royal Hotel. At the Institute of Engineers, June 12, 10 a.m., joint meeting of Diagnosis and Therapy Sections, discussion on "Cerebral Tumours," to be opened by Dr. M. H. Jupe, Prof. Dorothy Russell, Mr. Brodie Hughes, and Mr. J. Jackson Richmond. Further information may be obtained from the honorary secretary of the Faculty at 45, Lincoln's Inn Fields, London, W.C.2.

West London Medico-Chirurgical Society

Prof. E. N. da C. Andrade, D.Sc., Ph.D., F.R.S., will deliver the Cavendish Lecture before the West London Medico-Chirurgical Society at the Royal Society of Medicine (1, Wimpole Street, London, W.) on Tuesday, June 15, at 8.30 p.m. His subject is: "The Atom and Its Energy."

St. Bartholomew's Hospital

Barts men who practise in Gloucestershire, Herefordshire, and Worcestershire will hold their annual dinner at the Abbey Hotel, Malvern, on Friday, June 18, when Lord Horder will be the guest. Any Barts men in an adjoining county who wish to attend should communicate with Dr. J. S. Cookson, County Health Department, 35, Bridge Street, Hereford.

Royal Medical Benevolent Fund

The 112th annual general meeting of the Royal Medical Benevolent Fund will be held at the Medical Society of London, 11, Chandos Street, Cavendish Square, London, W., on Tuesday, June 29, at 5 p.m., with the President, Sir Alfred Webb-Johnson, Bt., P.R.C.S., in the chair. The statement of accounts for the year ended Dec. 31, 1947, will be presented and officials and committee of management for the ensuing year will be elected.

Congress in Prague

The General Assembly of the International Federation of Sport Medicine will be held in Prague as previously arranged on June 29, and the Seventh International Medical Congress of Physical Education will be held on July 1–5 in connexion with the Eleventh Sokol Festival. Visits to places of interest will be organized as required. Inquiries should be addressed to: Prof. Mudr. Jirí Král, Praha II, Vladislavova 15, Czechoslovakia.

SOCIETIES AND LECTURES

Sunday

LONDON JEWISH HOSPITAL MEDICAL SOCIETY.—At Rose Hertz Hall, Woburn House, W.C., June 6, 3 p.m. *"Some Clinical Entities Frequently Misdiagnosed,"* by Mr. Hamilton Bailey.

Monday

EDINBURGH UNIVERSITY: PHYSIOLOGY CLASSROOM.—June 7, 5 p.m. *"Medicine in Literature,"* by Dr. Douglas Guthrie.

WESTMINSTER HOSPITAL SCHOOL OF MEDICINE: MEYERSTEIN LECTURE THEATRE, Horseferry Road, London, S.W.—June 7, 5.30 p.m. Clinico-pathological demonstration. Discussion: *"Whooping-cough."*

Tuesday

BRITISH ASSOCIATION OF PHYSICAL MEDICINE.—At Hospital for Sick Children, Great Ormond Street, London, W.C., June 8, annual meeting, 2.30 p.m. *Clinical Demonstration of Physical Medicine in Children,* by Dr. F. B. Kiernander. 3.30 p.m. Discussion. At Royal College of Surgeons, Lincoln's Inn Fields, London, W.C., 5.30 p.m. Annual general meeting. 7 for 7.30 p.m. Annual Dinner at the College.

INSTITUTE OF DERMATOLOGY, 5, Lisle Street, Leicester Square, London, W.C.—June 8, 5 p.m. *"Occupational Dermatitis,"* by Dr. F. R. Bettley.

Thursday

INSTITUTE OF DERMATOLOGY, 5, Lisle Street, Leicester Square, London, W.C.—June 10, 5 p.m. *"Tuberculous Infections of the Skin,"* by Dr. L. Forman.

WEST LONDON HOSPITAL, Hammersmith, W., June 10, 8.30 p.m. *"Haematemesis and Melaena: An Investigation of the Place of Surgery in its Treatment"*; First Alex. Simpson Smith Memorial Lecture by Mr. Norman Tanner.

Friday

NATIONAL HOSPITAL, QUEEN SQUARE, MEDICAL SCHOOL, London, W.C.—June 11, 5 p.m., *"The Cerebellum Reconsidered,"* by Prof. John Fulton (Yale).

ROYAL COLLEGE OF OBSTETRICIANS AND GYNAECOLOGISTS, 58, Queen Anne Street, London, W.—June 11, 2.15 p.m. *"Accelerated Painless Labour,"* by Prof. N. C. Louros (University of Athens).

UNIVERSITY COLLEGE LONDON.—At No. 1 Lecture Theatre, University College Hospital Medical School, W.C., June 11, 4.30 p.m. Holme Lecture: *"Burns and Fluid Balance,"* by Prof. Oliver Cope (Harvard Medical School).

Saturday

SURREY COUNTY MEDICAL SOCIETY.—At Milford Sanatorium, June 12, 3 p.m. Clinical meeting.

APPOINTMENTS

The Director of Medical Services is included in a list of officials who have been appointed Nominated Official Members of the Legislative Council of the Colony of Kenya.

GRAY, WILLIAM D., M.B., Ch.B., Clinical Tuberculosis Officer, Liverpool.

STEWART, A. B., M.D., D.P.H., Divisional Medical Officer, National Health Service.

WALLACE, W. H. S., M.D., D.P.H., Divisional Medical Officer, National Health Service.

WARWICK, NINA S. S. SEAFORD, M.B., Ch.B., D.O.M.S., Assistant Honorary Ophthalmic Surgeon, Macclesfield General Infirmary.

BIRTHS, MARRIAGES, AND DEATHS

BIRTHS

Elsom.—On May 24, 1948, at Victoria Hospital, Lichfield, to Joyce (née Grant), wife of Dr. A. R. Elsom, Burntwood, Lichfield, a daughter—Ruth Margaret.

Lush.—On May 19, 1948, to Dr. Margaret Lush, wife of Dr. Brandon Lush, a daughter.

McCullough.—On May 23, 1948, to Dr. and Mrs. J. K. H. McCullough, a daughter—Elizabeth Jane.

MARRIAGES

Davey—Pearson.—On June 5, 1948, at Christ Church, Summerfield, Birmingham, Charles James Constantine Davey, M.B., Ch.B., M.R.C.S., L.R.C.P., son of Mr. and Mrs. W. E. Davey, of Dorridge, Warwickshire, to Gwynneth June Pearson, M.B., Ch.B., daughter of Dr. and Mrs. A. S. Pearson, Gillott Road, Birmingham.

Morrison—Myles.—On May 8, 1948, Dr. Leslie Gordon Morrison, M.C., to Dr. Alexina Myles.

DEATHS

Davey.—On May 25, 1948, at Bampton, Oxford, Thomas Ronald Davey, M.R.C.S., L.R.C.P., aged 62.

Field.—On May 24, 1948, at Worthing, Oliver Field, M.D.Ed.

Gill.—On May 27, 1948, at 22, Gladstone Place, Aberdeen, Frank Austin Gill, M.D.Aberd.

Lyon.—On May 24, 1948, at Deal, Thomas Lyon, M.D.Ed., aged 66.

McFall.—On May 24, 1948, at Guy's Hospital, London, S.E., George Edens McFall, M.B., B.S., late R.A.F.V.R.

Macnair.—On May 26, 1948, at Avondale, Marple, Cheshire, Frank Gordon Macnair, M.D.Ed., aged 46.

Moran.—On May 21, 1948, at a private nursing home in Dublin, Louis Augustus Moran, L.R.C.P &S.I.&L.M.

Newman.—On May 26, 1948, Sir George Newman, G.B.E., K.C.B., M.D., F.R.C.P., of Grims Wood, Harrow Weald, Middlesex, late Chief Medical Officer, Ministry of Health, aged 77.

Any Questions?

Correspondents should give their names and addresses (not for publication) and include all relevant details in their questions, which should be typed. We publish here a selection of those questions and answers which seem to be of general interest.

Morphine in Obstetrics

Q.—*What is the action of morphine on unstriated muscle generally, and on the uterine muscle in particular? What influence does morphine exert on the uterine muscle in the treatment of the following conditions: (a) threatened abortion; (b) placenta praevia ("expectant" treatment); (c) prolonged labour due to secondary uterine inertia caused by rigid soft parts? Does morphine even in full therapeutic dosage abolish, or in any way modify, the contractility of the pregnant uterus?*

A.—Morphine does not have a specific action on all plain muscle throughout the body. The organs whose muscle is said to be influenced are the stomach, small and large bowel, and the uterus. Its action on the alimentary tract is still subject to dispute, its well-known constipating effect being said to be due either to diminished peristalsis and to contraction of sphincters or to a generalized increased tone of the intestine associated with diminished contractions. The views of different authors are contradictory, and it would seem that the effects may not only vary in different parts of the bowel but with the dosage. Whatever its effect, it is not known whether morphine acts directly on the muscle or whether it interferes with the peripheral reflex. In practice, however, it seems highly probable that morphine often influences bowel function indirectly through its action on the central nervous system. This is particularly true in the case of post-operative ileus, where the beneficial effect of morphine may well be due, in part at least, to the relief of anxiety, nervousness, and pain, which can be important aetiological factors.

There are again conflicting opinions on the effect of morphine on the uterus, but the balance of experimental work carried out on the human subject goes to show that morphine has no significant direct effect on expulsive uterine contractions associated with abortion, labour, or the puerperium. It does, however, reduce uterine spasm in labour and is therefore valuable in all forms of incoordinate uterine action. Here, too, its effect is probably explained by its action on the brain; by relieving pain and nervous tension it frees the uterus from the influence of an overactive autonomic system. More efficient action of the uterus and easier dilatation of the cervix, which are commonly observed when morphine is used in cases of inertia or of normal labour, are due to the removal of the inhibitory effects of the central nervous system rather than to any direct action on the muscle. When the obstetric condition is characterized by haemorrhage, as in placenta praevia or abortion, morphine is again valuable, but only because it induces comfort and quiet, which in turn favour haemostasis. If morphine does not inhibit uterine contractions and may, even indirectly, facilitate dilatation of the cervix, it might be argued that it is contraindicated in threatened abortion. This is not necessarily true, for morphine does not initiate dilatation of the cervix, and by ensuring mental and physical rest it helps to remove possible uterine irritants.

Parkinson's Disease

Q.—*(a) Is the operation of division of the pyramidal tracts in the spinal cord of value in the treatment of Parkinson's disease? What are the indications and results?*

(b) The fact that Parkinsonian tremor disappears when the patient is asleep leads me to ask whether hypnosis has ever been tried as a means of controlling tremor and, if so, with what degree of success?

A.—(*a*) This operation has been carried out on small groups of people with Parkinson's disease. It is too early yet to give an indication of its value, but there is no doubt that some patients with severe paralysis agitans have benefited. The purpose of the operation is to destroy the upper motor neurone, either in the cerebral cortex or in the pyramidal tract itself,

for the disturbance in paralysis agitans is caused by the pyramidal tract working in the absence of extrapyramidal control. It follows that a reduction in the disability caused by the Parkinsonism is in direct proportion to the degree of pyramidal hemiplegia. Because of this, the operation should be considered only in severe cases and preferably if only one side is affected.

(*b*) All abnormal movements arising as a result of disturbances of the basal ganglia disappear during sleep, but they return on waking, whatever may have been the nature of the sleep. The disturbances are in no way due to psychological causes and are not benefited at all by hypnosis.

Treatment of Ringworm

Q.—*What is the most successful treatment for tinea pedis and tinea cruris? Is dithranol ointment safe in a 1% strength? Is it advisable to do anything about sterilizing clothes, shoes, etc., as was at one time recommended in the Middle East, and, if so, what method would you advise?*

A.—Tinea cruris clears rapidly with dithranol, and a 1% strength is quite safe. Response to treatment of ringworm of the toes is more variable and depends upon the chronicity, the presence or absence of infection of the nails, the degree of secondary eczematization, climate, and other circumstances. Various treatments are appropriate to different stages. It is generally wise to use a variety of local measures at night, turn and turn about, among which dithranol ointment is valuable, as is carbol-fuchsin paint or:

Hydrarg. perchlor	0.5%
Brilliant green	0.5%
Spirit	ad 100

Make a paint.

Various other newer fungicides may be used in the morning. The feet should be washed, thoroughly dried, and well powdered. It is wise to sterilize stockings and shoes with formalin and to avoid infecting bath mats, etc., by using slippers for bathing.

Treatment of Callosities

Q.—*What is the best treatment for a callosity on the sole of the foot, opposite the second metatarsal head? The condition may persist for years, and paring, salicylic acid, and rings have little effect.*

A.—Callosities of the type described are commonly found in association with pes cavus, or with simple flattening of the transverse arch of the foot. There is impairment of the intrinsic muscles with consequent inability of the toes to exercise their important function of sharing the pressure of weight-bearing and walking with the metatarsal heads. Treatment should be directed primarily to the correction of the underlying foot defect. The function of the intrinsic muscles will often be much improved by a suitable course of physiotherapy. This should include intensive foot and toe exercises, and faradic stimulation of the affected muscles. It is important that the exercises be continued at home for an indefinite period.

These measures should in most cases be supplemented by the provision of a suitable support for the transverse arch of the foot. A "sorbo" metatarsal pad on the removable leather insole is satisfactory. The accurate placing of the pad is important: it should lie beneath the necks of the central metatarsals 1/2 inch to 3/4 inch (1.25–1.85 cm.) behind the metatarsal heads. Paring of these callosities is unlikely to give more than temporary relief unless it is used in conjunction with corrective measures of this kind.

Mud Treatment of Rheumatism

Q.—*Has Pistany mud any special virtues in the treatment of rheumatic complaints? Is there any British product of equal or similar merit? I should be grateful for any other information on this matter.*

A.—Pistany mud is the mud deposited at the mouth of the springs of Pistany, a Czechoslovakian spa, and belongs to the group of peloids which includes muds of all kinds and peat. There are similar substances obtainable at most of the British spas, and when applied in conjunction with hot douching and similar procedures they are certainly beneficial in the treatment of joint diseases and other forms of rheumatism, but they are not much used away from the spas. The fact that before the war Pistany mud was readily obtainable on the market and widely advertised made it popular. The action of poultices in general as applied in the home is the same as that of any kind of mud, but special claims are made for alleged radioactivity in some forms of mud. There is as yet no scientific proof that such low-grade radioactivity has anything more than a mild counter-irritant action. Beneficial effects are more likely to be due to the moist heat and the mild pressure exerted by the pack, which aids the absorption of exudates and stimulates the circulation of the affected part. To obtain the full effect of such treatment a course at an appropriate spa is probably desirable.

Angioneurotic Oedema

Q.—*A young man aged 19 suffers annually from hay-fever; he is normal in all other respects. For the past two years, after a course of injections for the hay-fever, he has had frequent attacks of angioneurotic oedema. Repeated examinations have not disclosed the cause, but I think it probable that the hay-fever injections have started the attacks. The only treatment that has had any effect is adrenaline injections, but these have been discontinued as the last one precipitated alarming anaphylactic shock. Belladonna, bromides, etc., have failed. Can you suggest any other treatment?*

A.—In the absence of a discoverable cause, the best treatment is likely to be symptomatic therapy with one of the antihistaminic drugs, "antistin" or "benadryl." They should be taken as early in the attack as possible, and can be used prophylactically, especially if side-effects are absent or minimal. The first few doses of benadryl should be taken at home owing to the risk of their making the patient drowsy. Papers on "antistin" and "anthisan" with some comment in a leading article appeared in the *Journal* of May 8.

Pitressin in Hypertension

Q.—*Is pitressin tartrate useful for lowering a high blood pressure, and is the reduction so obtained permanent? What are the rules governing its use? Are there dangers associated with its administration?*

A.—The writer has never heard of pitressin tartrate and can find no reference to such a substance. Pitressin tannate, a water-soluble compound, has been used, suspended in peanut oil, to control diabetes insipidus (Greene and January, *J. Amer. med. Ass.*, 1940, **115**, 1183). The effect of pitressin on the blood pressure in man varies considerably. Melville and Stehle (*J. Pharmacol.*, 1931, **42**, 455) showed that the fall in blood pressure produced by pitressin is not due to vascular dilatation but to the constrictor effect on the coronary vessels leading to inability of the heart to maintain the blood pressure. For this reason it should never be used in an attempt to lower the blood pressure.

NOTES AND COMMENTS

Antrum or Anatomy.—Mr. DESMOND W. CONWAY, Golden Square, W.1, writes: May I draw attention to a possible misprint in the *Journal* of May 29, which concerns the report of Dr. Julius Lempert's lecture (p. 1045)? He is quoted as saying that his second reason for his use of magnifying glasses, while performing a mastoidal tympanectomy, is "you will see for the first time how beautiful the antrum is." I think it should read as ". . . how beautiful the anatomy is" (of mid-ear). Any otologist performing a radical mastoidectomy will delight in the anatomy of the antrum but not for reason of its beauty.

Correction.—In our obituary notice of the late Captain E. Watson, D.S.O., R.N. (May 29, p. 1054) the phrase "at the close of the war" in the fourth paragraph should have read "at the close of the day."

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